KODIAK MANAGEMENT AREA
HERRING REPORT
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By

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ABSTRACT

The Kodiak Management Area (KMA) 2001 commercial sac roe Pacific herring *Clupea pallasi* fishery extended from April 15 through June 30. A total of 33 purse seiners and 9 gillnetters harvested 1,694 tons, compared to the preseason guideline harvest level (GHL) of 1,540 tons. A total of 36 sections were open to fishing and harvests occurred within 20 sections. This was the second season of management under the allocative harvest strategy that provides 75% of the total Kodiak GHL to seine gear and 25% to gillnet gear. Purse seine gear accounted for 83% of the total catch at 1,412 tons. Roe recovery percentages averaged 9.8% for seine gear and 10.4% for gillnet gear. The total exvessel value of the fishery was $847,000, which is the fourth lowest total value in the history of the fishery. Age-4 herring were the dominant age class harvested, representing an estimated 41% of the purse seine harvest.

The KMA food and bait herring fishery was designated a limited entry fishery in 2001. A cooperative fishery was conducted that allowed one catcher vessel to fish with a department observer onboard. There was no allocation of Lower Cook Inlet, Kamishak stock herring allowed for the Shelikof Strait fishery, due to concerns for the low stock status and young age classes of Kamishak herring. The Eastside District and that portion of the Uganik District south of the latitude of Miners Point were open to fishing. The Uganik District was closed on October 1, 2001, with a harvest of 63 tons and the Eastside District was closed on November 15, 2001, with a harvest of 51 tons.

A total of 47 subsistence herring permits were issued through December 18, 2001. The department issued an emergency order reducing the maximum allowable harvest to 1,000 pounds per permit for the Northeast, North Afognak, South Afognak, Inner Marmot, and Uyak Districts. The total catch from nine returned permits was 14,015 pounds.

INTRODUCTION

This report presents information concerning the commercial sac roe Pacific herring *Clupea pallasi* fishery and food and bait herring fishery that occurs in the Kodiak Management Area (KMA). This information includes a regulatory history, historical harvest data by fishery, age and weight data of the commercial harvest, and fishery management activity. This report also provides subsistence herring fishery data. This report is intended as a reference document; interpretation and discussion of the data are therefore limited.

Area Description

The KMA comprises the entire Kodiak archipelago and that portion of the Alaska Peninsula that extends from Cape Douglas southwest to Kilokak Rocks at Imuya Bay. The archipelago is approximately 150 miles long, extending from Shuyak Island south to the Trinity Islands. The Alaska Peninsula portion is about 160 miles long and is separated from the archipelago by the Shelikof Strait that averages 30 miles in width (Figure 1).

SAC ROE HERRING FISHERY

Historical Perspective (1964-2001)

The commercial sac roe herring fishery began in Kodiak in 1964. From 1964 through 2001 sac roe herring harvests averaged 1,921 short tons (tons) (Table 1; Figure 2). From 1964 through 1977 purse seine gear was used exclusively, with an average annual harvest of 898 tons. Prior to 1974 the fishery was unregulated with regard to harvest quotas, gear types, seasons, and fishing periods. Annual harvests, along with effort levels, herring abundance, prices, and processor interest, fluctuated greatly from 1964 through 1977. Improved market conditions in 1978 prompted increased effort in this fishery with 28 purse seiners and seven gillnetters participating. Between 1977 and 1982 the regulatory and management strategy went through a rapid development phase. It was during this period that spotter aircraft and tenders became involved in the fishery. Regulatory changes focused on gear efficiency, gear conflicts between seiners and gillnetters, and gear restrictions (exclusive registration and limited entry).

In the 1990s closures of the Prince William Sound and Kamishak sac roe herring fisheries and increases in the Kodiak herring stocks resulted in increases in seine effort in the Kodiak fishery. Many of the inactive Kodiak seine permits were purchased by "circuit seiners," individuals who fish all of Alaska's major herring fisheries from Sitka to Bristol Bay. These circuit seiners were very experienced fishers with high quality sonar electronics, nets, and vessels. With the addition of the circuit seiners to the already efficient local Kodiak seine fleet, effort levels grew with 73 vessels making landings in 1995. The increased seine effort made controlling harvests difficult. Regulatory changes involved several seine depth reductions and shorter seine fishing periods to reduce harvest rates. Herring prices dropped from a record $2,000 a ton in 1996 to record low $300 a ton in 1997 and 1998 (Table 2). With the sharp decline in prices, effort levels also dropped and gillnet gear

accounted for a diminishing percent of the total harvest in the late 1990s. In 2000 an allocative harvest strategy, including separate gear areas and harvest allocations, was established in regulation.

Season Dates

From 1974 through 1978 the season extended from March 1 through June 30. From 1979 through 1981 it was reduced to May 1 through June 30. In 1982 the season opening date was changed to April 15. The April 15 to June 30 season dates remain in effect.

Fishing Periods

Fishing periods from 1964 through 1978 were 24 hours per day, seven days per week. In 1979 and 1980 the fishing periods were scheduled with 48-hour openings followed by 24-hour closures. In 1981 the fishing periods were further reduced to 24-hour openings followed by 24-hour closures (NOON on odd-numbered days of the month to NOON on even-numbered days of the month), which remained in effect through 1994. In 1995 an emergency order was issued to reduce fishing periods to 10 hours for both gear types from April 21 to May 2.

From 1996 through 1999 fishing periods were limited for purse seiners to 13 hours in duration from April 15 through May 4 and beginning on May 5 fishing periods were 24 hours in duration followed by 24-hour closures for the remainder of the season. In 2000 and 2001 fishing periods were 12 hours in duration from April 15 through May 7 and from May 8 through June 30 they were 13 hours in duration, with 24-hour closures between periods.

Since 1981 gillnet fishing periods have been set at 24-hour openings followed by 24-hour closures for the duration of the season except in 1995, when fishing periods were restricted by emergency order to 10 hours in duration.

Gear

Purse seine gear was unrestricted in this fishery through 1973. In 1974 it was limited to 150 fathoms in length and 1,000 meshes in depth. In 1979 gillnet lengths were first limited to a maximum of 300 fathoms with no depth restriction. In 1981 the maximum lengths were reduced again, to 150 fathoms for gillnets and 100 fathoms for purse seines; these regulations remained in effect through 1995. Also, in 1981 trawls and beach seines were eliminated as legal gear for the sac roe fishery. In 1996 purse seine depths were restricted to a maximum of 20 fathoms and gillnet depths were restricted to 230 meshes. In 2000 the seine depth was reduced to a maximum of 18 fathoms.

Gear Levels

Beginning in 1979 combined gear levels increased substantially from historic levels, reaching a high of 201 units (92 seine and 109 gillnet) in 1980 and 193 units (79 seine and 114 gillnet) in 1981 (Table 2; Figure 3). With the implementation of limited entry following the 1981 sac roe season, new entry into the fishery was restricted to past participants until permanent transferable permits could be awarded. From 1982 through 1993 gear levels were relatively constant with 29 to 45 seiners and 62 to 86 gillnetters participating. With an increase in herring abundance, an increase in

herring prices, and the closure of the Prince William Sound herring fishery, seine gear participation increased abruptly during the 1994 through 1997 seasons, with 74 vessels fishing in 1997. The escalation in seine gear participation resulted in increased competition among seiners and between seiners and gillnetters. In 1997 and 1998 herring prices declined. After 1997 seine participation fell over 50% (average 32 vessels). Gillnet gear participation took an even sharper drop, with 59 permit holders fishing in 1997 but only an average of eight gillnet fishermen participating annually since 1997.

Guideline Harvest Levels

From 1974 through 1978 there was an area-wide harvest quota of 3,400 tons. From 1979 through 1984 the area-wide harvest quota was reduced to 2,400 tons and GHLs were established for four large geographical areas. Descriptions of districts and sections were established in regulation in 1981, with seven districts and 46 sections identified. Starting in 1985 GHLs were established on an annual basis by section and were based on stock status trends. From 1985 through 2001 the combined annual GHLs of all sections ranged from a high of 4,550 tons in 1994 to a low of 1,495 tons in 1999. During the last three years GHLs for the fishery have been at low levels, based on more conservative management and, for some sections, declines in herring abundance. The preseason GHL has generally reflected the actual harvests (Figure 5) and has aided fishermen and processors in planning prior to the start of each season.

Harvest Strategy

The overall regulatory effect during the developmental phase of the fishery (1977-1982) was the emergence of a relatively stable sac roe herring fishery through 1991. Two strong year classes, from the 1987 and 1988 brood years, resulted in dramatically increased stocks and record to near-record harvests occurred in the 1992 through 1995 seasons, ranging from 4,283 to 5,893 tons (Table 2). The increase in herring abundance occurred during years of high prices and fishery participation grew. With the crash in prices, followed by herring stock declines, gillnetters had little harvest opportunity when competing against seiners and they promoted a change in fishery management.

An allocative harvest strategy was developed through the efforts of a Alaska Board of Fisheries (BOF) Herring Task Force (established in 1999) that consisted of purse seine permit holders, gillnet permit holders, and department staff. The harvest strategy provides opportunity for gillnet permit holders to harvest approximately 25% and purse seine permit holders to harvest approximately 75% of the total preseason GHL for the management area.

The harvest strategy requires the department to establish GHLs by section, based on historical harvest data, current and past fishery performance, commercial catch samples, and aerial surveys. The department is then required, for each district that has more than one section open to fishing, to assign, by section, 20% to 30% of the GHL to gillnet permit holders and 70% to 80% of the GHL to purse seine permit holders.

In 2000 ten gillnetters harvested 6% of the total harvest under the allocative harvest strategy, though cold climatic conditions were thought to have disrupted the spawn timing and roe development resulting in reduced harvests (Table 2). In 2001 nine gillnetters took 17% of the total harvest.

An additional conservation provision of the allocative harvest strategy provides for district GHLs. If the harvest from an individual section exceeds the section GHL then the overage is applied to the district GHL. The actual section harvests are summed and if the harvest from any number of sections within a district meets the aggregate GHL for that district, then the remaining open sections in that district are closed to further fishing, regardless of the remaining section GHLs. This action may result in reduced harvests in sections that have later returning and spawning herring stocks.

Fishery Management

Districts and Management Sections

The KMA is currently divided into 13 districts, which define geographical areas used in managing both the sac roe and food and bait herring fisheries (Figure 4). For the sac roe fishery each district is divided into management sections that are intended to define the spawning area used by a stock of herring or define a geographical area. There are a total of 82 management sections.

GHL Criteria

Preseason GHLs are established for all management sections that have produced consistent herring harvests in previous seasons. These GHLs reflect the status of a particular stock of herring, by management section. The GHLs have ranged from 10 to 700 tons by section. Criteria for establishing the 2001 GHLs involved evaluation of a variety of information to determine stock status trends and conservative adjustment of GHLs, including: 1) fishery performance during preceding season or seasons (i.e., harvest timing, harvest duration, average school size); 2) trends in age composition (i.e., level of recruitment (age-3 herring) in catch samples, the proportion of the spawning population age-5 and younger, and the proportion of age-2 herring in the spawning biomass (an indicator of future recruit strength)); 3) observations of spawn and juvenile herring; 4) industry and department aerial surveys; 5) hydroacoustic surveys; 6) test fishery data including age composition and biomass estimates; and 7) aged-structured analysis (ASA) modeling.

Fishery Characteristics

The KMA sac roe herring fishery currently occurs in approximately 30 bays and coastal locations. The fishery opens at NOON on April 15, with the entire management area opening at one time excluding those sections where the stocks require protection. A unique characteristic of this fishery is that it typically commences prior to any major buildup of herring. This has generally allowed for a greater distribution of effort, which can reduce harvest rates within individual bays.

To reduce operational costs and to cover more areas, most purse seiners form combines of two to ten vessels. These combines usually include one or several tenders and spotter aircraft. Airplanes have been a very productive way to find harvestable herring and direct seiners to those locations.

Gillnet vessels generally work independently and deliver their fish to the processing location. A few gillnetters are equipped with scanning sonar but the majority of these fishermen rely on color down-sounding sonar to locate herring schools.

The department relies on the fishing industry to establish roe recovery standards. Generally, tenders will have a processor representative onboard to ensure that marketable, sac roe quality, herring are harvested. Competition among shorebased processors has resulted in this fishery having one of the highest per ton exvessel values in Alaska. The quality of Kodiak sac roe herring is generally high, due to inseason processing of a relatively small amount of herring over a long time period.

Fishery Monitoring

This fishery is primarily managed on the fishing grounds by stationing department management personnel aboard state vessels or at shorebased tent/cabin field camps. The field crews are stationed in management sections that have historically produced the largest harvests for a district. These field crews are positioned in remote bays by chartered floatplanes or vessel and are equipped with an inflatable raft or skiff. Daily contact with fishermen, spotters, and tender operators is maintained in order to acquire fishery data. Area management biologists receive reports from field personnel several times daily that include current harvest, effort levels, and fleet movement information, reported by single side band (SSB) radio or satellite phone systems. The use of field personnel has been a key element in supporting this fishery's harvest strategy and preventing excessive harvests. Field personnel also identify herring spawning areas and collect age-weight-length (AWL) samples from the commercial harvest. Department aerial surveillance of the entire area supplements and often directs the placement of fishery monitoring field personnel.

Inseason Fishery Management

Processors and independent tender operators are required to provide daily tallies of herring deliveries by management section as well as accurate estimates of herring onboard tenders that have not yet delivered to the processor. Area management biologists tally reports from field personnel, processors, and tenders, to assess herring harvests. Generally, once the harvest estimate meets or approaches the GHL, a management section is closed for the season by emergency order. Due to the rapid pace at which some harvests occur, inperiod closures are frequent. In management sections that have field personnel present inperiod closures may occur with as little as five minutes advance notice on the grounds. In management sections that do not have field personnel present inperiod closures may occur by either an announcement broadcast on SSB frequency 4.125 MHz following the marine weather forecast (at 8:00 AM or 6:00 PM daily), at 10:30 PM, or by field announcement with the arrival of department staff.

Timely and accurate harvest reports, from department field personnel, permit holders, spotters, and processors, are critical for assessing herring harvests and managing the fishery. To date, industry cooperation has greatly aided managers.

Enforcement Issues

The Alaska Department of Public Safety, Fish and Wildlife Protection (FWP), provides thorough enforcement coverage of the KMA herring fishery during the first two weeks of the season when effort levels are the greatest. The FWP utilized a vessel and an aircraft to monitor the 2001 fishery and worked closely with the department during the fishery.

The presence of FWP greatly reduces the enforcement burden on department field crews, especially during openings, closures, and inperiod emergency closures. During the fishery the majority of enforcement problems concern early (prior to the NOON or 9:00 AM openings) or late (after the closure time) purse seine sets. With the new harvest strategy the gear conflicts, though minor in the past, are now non-existent.

2001 Season Summary

The total 2001 GHL was 1,540 tons, with 1,135 tons of the GHL (74%) assigned to purse seiners and 405 tons of the GHL (26%) assigned to gillnetters (Gretsch 2001). The 2001 sac roe herring season opened at NOON on April 15 and continued through June 30. The April 15 opening day harvest was a record 918 tons (54% of the total GHL) and the last harvest occurred on May 31 (Figure 6). Mild winter and early spring climatic conditions likely contributed to the early arrival and excellent roe quality of the herring. A total of 42 permit holders made 104 deliveries during the season, with 33 purse seiners harvesting 1,412 tons and nine gillnetters harvesting 282 tons. Effort levels in 2001 were similar to the past four years for both gear types, with seiners ranging from 31 to 35 permit holders and gillnetters ranging from 5 to 10 permit holders (Figure 3).

There were a total of 36 sections open to fishing and harvests occurred within 19 sections (Table 3). The department designated the five southern most sections of the Mainland districts as exploratory in 2001, which were open to both gear types with no GHLs. No fishing effort occurred in the three Mainland districts primarily due to the low herring values, small GHLs, and logistics of fishing these districts. The department also opened two sections in the West Afognak District (Malina Bay and Raspberry Strait), to gillnetting with small GHLs (15 tons); these sections had been closed since 1997. The Danger Bay Section of the South Afognak District was also opened to gillnetting with a 15 ton GHL; this section had been closed since 1995. Fishery performance in Malina and Danger Bays was excellent but poor in Raspberry Strait.

The 2001 GHL (1,540 tons) was the second lowest GHL since 1979 (Figure 5). The 2001 harvest of 1,694 tons was the fourth lowest harvest since 1979. Purse seine gear accounted for 83% (1,411 tons) and gillnet gear accounted for 17% (282 tons) of the harvest (Figure 7). A total of 26 tenders were registered to transport herring to processors. There were five shorebased plants registered to process herring.

The 2001 fishery was monitored by three department shorebased field crews and two department vessels, which were stationed in anticipated herring harvest locations. These crews monitored the fishery to gather effort and harvest data used to manage the fishery, and collected commercial catch samples to obtain age, weight, and length (AWL) data.

Exvessel Value of the Fishery. The price paid for 10% roe recovery herring was $500 per ton, approximately $200 a ton greater than paid in 1997 and 1998. Roe recovery percentages, from fish ticket data, averaged 9.8% for seine gear and 10.4% for gillnet gear. The average exvessel earnings for purse seiners was $21,400 and for gillnetters was $15,700, with the gillnet earnings being the highest experienced since 1996 (Figure 8). The total exvessel value of the 2001 fishery was $847,000, which is the fourth lowest total value in the history of the fishery (Figure 9). The record low value of this fishery occurred in 1998 when 2,057 tons were harvested for a total exvessel value of $617,100.

Catch Sampling

A total of 4,019 herring were collected for age-weight-length (AWL) analysis from the purse seine harvests in 10 sections (Figure 10). These 10 sections accounted for 99% of the total KMA purse seine harvest. All samples were combined and weighted to the harvest and age-4 herring were the dominant age classes harvested in the 2001 season, representing an estimated 41% of the total purse seine harvest (Table 4). The remaining age classes represented the following percentage of the seine harvest: age-3 (11%), age-5 (2%), age-6 (2%), age-7 (9%), age-8 (17%), age-9 (2%), age-10 (3%), age-11 (4%), age-12 (6%), and age 13+-(2%).

A total of 375 herring were collected for AWL analysis from the gillnet harvest in four sections (Figure 10). These four sections accounted for 78% of the total KMA gillnet harvest. With all samples combined and weighted to the harvest, age-8 herring were the dominant age class representing 39% of the gillnet harvest (Table 5). The remaining age classes represented the following percentage of the gillnet harvest: age-4 (19%), age-5 (2%), age-6 (7%), age-7 (25%), age-9 (4%), and age 10+-(3%).

Generally, the herring from the east side of Kodiak Island (Eastside District) were larger at age than those found on the west side of Kodiak and Afognak Islands (Uganik and West Afognak districts; Table 6 and 7). Weight-at-age of the younger age classes in 2001 was similar to that observed in recent years.

Test Fishery and Stock Assessment

The department evaluates fishery performance and survey information to assess trends in stock status. Department hydroacoustic and aerial surveys are utilized to assess herring abundance prior to, during, and after the commercial fishery and to survey closed sections. Department vessels are used to collect samples by either trawl or gillnet gear.

The department conducted a test fishery (revenue-gathering) program in 2001, and 72 tons of herring were harvested from the Village Islands Section of the Uganik District. The funds generated were utilized to contract two seine vessels to conduct sonar surveys and make test sets on herring schools in the Uyak, West Afognak, South Afognak, Northeast, and Inner Marmot Districts. The primary emphasis of this project was to survey sections that have been closed to commercial fishing for several years to evaluate the spawning stock status and collect age samples. Surveys were also conducted in several sections that had already been closed to fishing to evaluate post-fishery age compositions and biomass. The Afognak Districts and Inner Marmot District were surveyed from May 7 to 12 and the Uyak District survey occurred from May 15 to 20.

Department and industry aerial surveys also supplemented the hydroacoustic surveys of these and other closed sections. Industry spotters have greatly aided managers during past seasons by providing biomass estimates, spawn observations, fleet movements and harvest estimates. These spotters are very experienced and many have been involved for several seasons in the KMA and other statewide herring fisheries. The department has received excellent assistance from industry spotters and air charter pilots with herring and spawn observations.

The result of aerial and hydroacoustic assessments provide a limited evaluation of the total biomass. Problems associated with herring assessment in the KMA include: 1) herring tend to be near the surface, and hence more visible, during the evening and early morning hours limiting the time fish are observable from the air; 2) most management sections have several distinct schools of herring that return to spawn from April through June; 3) herring may stay within an area for the duration of the sac roe season or may move to another district so that biomass estimates may be duplicated, incomplete, or incorrectly assigned to a spawning stock location; 5) the KMA encompasses a large geographical area (73 sections); 6) differential spawn timing of various KMA herring stocks; and 7) adverse weather conditions. Hydroacoustic surveys are also limited in shallower waters, and the extent of herring avoidance of vessel noise is unknown. There also appears to be a significant amount of subtidal spawning, occurring in water 10 to 20 fathoms in depth, which is not detectable from aerial surveys.

Stock Status by District

The following is a review of stock status that summarizes recent fishery performance, age composition data, recruitment trends, and survey data by district. Herring can generally be found seasonally in all bays of the KMA. The department currently monitors approximately 70 sections that are known to have spawning populations of herring. The department relies greatly on fishery performance and catch samples to help evaluate trends in stock status. The majority of the department assessment efforts target larger herring stocks. Generally, there is less information available for the smaller stocks of herring so the evaluation process of these stocks is more tenuous. In some cases, such as sections of the Mainland District, several years may elapse before new information becomes available.

West Afognak District

There are six sections in the West Afognak District, and five have spawning stocks of herring. Paramanof Bay has the largest spawning stock within this district. The Paramanof fishery performance has been excellent during the last 10 years and harvests have ranged from 362 to 709 tons. The large increase in this herring stock and associated harvests were related to the very strong 1988 brood year, and production has remained good. Large spawns have occurred annually since 1994 and spawning occurred over a three-day period in 2001. Department hydroacoustic surveys on April 18, three days following the 2001 commercial fishery, documented at least 2,000 tons remaining on the grounds. Age compositions from the 2001 fishery show the dominant age classes from the commercial catch were age-4 (29%), age-7 (12%), age-8 (17%), and age-12 (13%); (Table 4). Age-3 (recruit) herring represented only 4% of the 2001 harvest. Additional post-fishery hydroacoustic surveys were conducted on May 9 and 10. These surveys found approximately 200 tons of new herring had moved into the bay, though the volume of spawned-out herring present complicated the surveys. Samples collected showed that additional recruit herring were present, with an age composition of age-3 (17%), age-4 (42%), age-7 (10%), and age-8 (12%) herring.

The Foul Bay Section is adjacent to Paramanof Bay. Age compositions and recruitment events tend to be similar, though the Foul Bay spawning stock is much smaller than Paramanof Bay. Foul Bay has been designated as a gillnet section. Fishery performance was excellent in 2001, though poor in 1999

and 2000. No samples of the commercial catch were collected in 2001, so no new age composition data is available

The Malina Bay Section was closed to commercial fishing from 1997 through 2000. Aerial and hydroacoustic surveys (1998, 1999, and 2000) and AWL samples (2000) indicated that the spawning biomass was rebuilding and this section was opened to gillnetting in 2001, with a 15 ton GHL. Fishery performance was excellent in 2001, and catch samples mainly consisted of age-7 and age-8 herring (67%).

The Raspberry Strait Section was also open to fishing in 2001 after being closed since 1997. Aerial surveys in 2000 had indicated that at least 150 tons of herring were present. This section was open to gillnetting with a 15 ton GHL in 2001, although only 0.3 tons were harvested. Hydroacoustic observations from commercial fishermen, department aerial and hydroacoustic surveys, and poor fishery performance indicate that the spawning stock remains weak.

North Afognak District

Five sections compose the North Afognak District. Spawning stocks of herring can be found in all five sections though these stocks tend to be small (less than 20 tons). Historically, small harvests have come from all five sections. The Perenosa Bay Section had the largest spawning stock and had a 56 ton catch in 1990. Declines in stock abundance and fishery performance prompted the department to close three sections to herring fishing in 1995, and a fourth section was closed in 1998. The Tonki Bay Section has been open to commercial fishing, based on aerial survey data, however fishery participation has been low (one vessel or less annually) and no catch has occurred.

South Afognak District

The South Afognak District comprises six sections. Only the Danger Bay Section was open to fishing in 2001; the remaining sections have been closed since 1995. Aerial surveys in recent years have shown a steady increase in the herring biomass of Danger Bay; the remaining sections have shown no stock increase. The increase in the Danger Bay stock prompted the department to open this section to gillnetting in 2001 with a small, 15 ton, GHL. Fishery performance was excellent and age composition data from the gillnet harvest showed the catch was predominantly age-7 and age-8 herring (72%). The department conducted a hydroacoustic survey and collected samples after the fishery. An estimated 300 tons of herring (minimum) were present, and samples revealed good recruitment with age compositions at age-3 (55%) and age-8 (26%).

Uganik District

Nine sections are identified in the waters of the northwest side of Kodiak Island. During the last 10 years this district has been the most productive in the KMA. The Village Islands Section supports the largest spawning stock, followed by South Arm Uganik, Terror and Viekoda Bays. Small stocks are also found in the West Uganik Passage, Northeast Arm Uganik Bay, and the East Arm Uganik Bay Sections, which are designated as gillnet areas. The Village Islands stock tends to move throughout the Uganik Bay complex (five sections) prior to spawning and historically has been harvested within

sections adjacent to Village Islands. Commercial catches in these adjacent sections were at times high, which reflects the strength of the Village Islands stock and not necessarily the spawning stock of the harvest location.

Hydroacoustic and aerial survey information indicate that the Village Islands spawning biomass is the largest currently found in the KMA. The total biomass is estimated from at least 4,000 tons to as much as 10,000 tons (herring congregate in Village Islands for a month or longer, complicating biomass estimation). Age composition data from the 2001 seine fishery shows a large number of young, age-3 (15%), and age-4 (63%), herring. The 2001 fishery performance was excellent, with the closure of the section occurring three hours into the season. Post-fishery seine sampling also showed a predominance of age-4 herring (35%) and a good distribution of older age classes. Large spawns have occurred annually in this section for at least 10 years. Fishery performance in the South Arm Uganik Section was also excellent in 2001 and accounted for nearly 40% of the total gillnet harvest. Age composition data from the gillnet catch showed age-4 (30%), age-6 (13%), and age-7 (41%) herring.

Commercial catch samples from the seine fishery in the Viekoda Bay Section also showed strong recruitment of (age-3) herring (20%), a predominance of age-4 herring (45%), along with age-7 herring (16%). The Terror Bay Section was closed prior to reaching the GHL due to poor fishery performance. Terror Bay age compositions were primarily age 3 (35%) and age 4 (46%), though the volume of age-4 herring was lower than anticipated based on the strong showing of age-3 herring in the 2000 fishery.

The small herring stocks found in the West Uganik Passage, East Arm Uganik, and Northeast Arm Uganik Sections had very little fishing activity in 2000 and 2001. All three of these sections have been designated as gillnet areas with 13 tons harvested in the last two seasons. Due to the low effort levels, fishery performance is not a good gauge of stock status for these sections.

Uyak District

Through the 1980s the Uyak District was the largest herring producing district in the KMA. In the early 1990s fishery performance and spotter observations indicated a decline in herring abundance. The department responded to this decline by reducing the GHLs for the sections of this district for the 1992, 1993, and 1994 seasons, but stocks continued to decline. In 1995 the entire district was closed to fishing, to promote the recovery of these stocks. The department proposed conducting studies to assess the size of the herring stocks and the age compositions within this district but funding was unavailable, and the Uyak District remained closed to fishing through 2001.

In recent years department vessels have been used to conduct limited hydroacoustic surveys. These surveys indicated the stock status for the district remained depressed, though the 2000 survey results were encouraging. A seine vessel was contracted in 2001 to survey for herring and collect age composition samples. The district was surveyed during a 4-day period (May 15 to 18) and Zachar and Spiridon Bays were found to have the largest amounts of fish. An estimated 150 tons of herring were found in the head of Zachar Bay and age compositions consisted of primarily age-4 (60%), age-7 (12%), and age-8 (9%) herring. In Spiridon Bay it was estimated that 75 tons of herring were present and samples showed an even composition of age-4 (22%), age-5 (22%), and age-8 (22%) herring. The Inner Uyak Bay Section was extensively surveyed for a two-day period. Only small schools of herring were found, totaling 20 tons or less. Seine sets were made on schools

of herring in the head of Uyak Bay, however only a handful of juvenile herring were caught. The Browns Lagoon and Larsen Bay sections were also surveyed and only small amounts of herring were observed (5 to 10 tons in each section). Aerial surveys were coordinated with the hydroacoustic survey to help find herring concentrations and direct the vessel. The aircraft was useful in locating schools of herring in shallow water.

Overall, observations made during the survey period indicated that the Inner Uyak, Browns Lagoon, and Larsen Bay stocks remain at low abundance. The Zachar and Spiridon Bay stocks appear healthier and are gradually rebuilding. Historically, the commercial fishery took place throughout the month of May, so it is likely that herring returned before and after the survey period and so are unaccounted for.

Northeast District

There are five sections in the Northeast District and four have known stocks of herring. Declines in fishery performance from 1995 to 1997 prompted the department to close this district to commercial fishing from 1998 through 2001. The Womens Bay Section had the largest stock of herring and commercial fishery harvests ranged from 74 to 149 tons for 1990 through 1992. This district has remained open to subsistence herring fishing and the subsistence harvest was 10 tons in 2000. Subsistence fishers estimated that approximately 100 tons were present (from sonar surveys) and a department aerial survey also indicated about 100 tons in 2000. The department conducted a hydroacoustic survey of the Womens Bay and Kalsin Bay Sections in 2001. Approximately 40 tons of herring were found in each of these sections and the age composition of samples from Womens Bay was primarily age-3 (42%) and age-4 (33%), which indicates good recruitment, and age-8 (17%).

Inner Marmot District

There are five sections within the Inner Marmot District. All sections have known stocks of herring though most are small. The Kizhuyak Bay Section has the largest stock of herring in the district with commercial harvests ranging from 102 to 117 tons from 1990 through 1992. Declines in fishery performance occurred from 1993 through 1995, and prompted the department to close the entire district from 1996 through 2001. Aerial surveys have consistently documented herring in this section in recent years, generally 50 to 100 tons. In 2001 the department conducted a hydroacoustic survey of Kizhuyak Bay and Anton Larsen Bay Sections. Approximately 115 tons were found in Kizhuyak Bay and a sample set revealed that age-2 herring comprised 100% of the sample. The Anton Larsen Bay Section was also surveyed, and 14 tons were observed with an age composition of age-5 (18%), age-6 (12%), age-7 (11%), and age-8 (53%) herring.

Eastside District

Four bay complexes compose the Eastside District: Ugak Bay, Kiluida Bay, East Sitkalidak Strait, and West Sitkalidak Strait. Sixteen sections have been established for the Eastside District and only one, the Outer Sitkalidak Section, has no history of sac roe herring harvest. Due to the reduced gillnet fleet and low herring prices the smaller and more distant gillnet sections of this district have not been fished in recent years, resulting in a lack of fishery performance information to help guide department stock evaluations.

Generally, the East and West Sitkalidak Sections have the earliest spawning concentrations of herring found in the KMA, with initial spawn occurring in late March. In the mid-1990s the East and West Sitkalidak Sections were the major herring producers of the district, but stock abundance and fishery performance slumped in 1996 and 1997. Part of the fishery performance problem was the difficulty fishermen had in finding marketable quality herring, as the stocks were generally mixed with ripe, green, and spawned out herring present. The department reacted to the changes in the stocks by reducing the GHLs. During the last five years the GHLs have been set low (40 to 50 tons) and the stocks have shown improvement. The age composition of 2001 commercial catch samples from East Sitkalidak was predominantly age-3 (13%), age-4 (55%), and age-8 (17%) herring. West Sitkalidak Strait is similar, with samples from the 2001 harvest consisting of age-3 (5%), age-4 (48%), and age-8 (32%) herring.

The Barling Bay Section, adjacent to the West Sitkalidak Section, has been the most consistent herring producer in the Eastside District. GHLs have ranged from 40 to 50 tons during the last 10 years and harvests have ranged from 39 to 66 tons. Samples were primarily comprised of age-3 (11%), age-4 (56%), and age-8 (23%) herring. The Three Saints Bay Section, also adjacent to the West Sitkalidak Strait Section, is designated as a gillnet section, but no harvests have occurred from this section in the last two years.

The Inner Kiliuda Bay, Outer Kiliuda Bay, and Shearwater Bay Sections have been consistent and strong herring producers during the last 10 years. Fishery performance was excellent in all three sections in 2001. Age compositions in the Kiluida Sections included a strong recruitment of age-3 (22%), age-4 (42%), and age-8 (27%) herring. No samples were collected from the gillnet catch from Shearwater Bay, though generally the age composition is similar to the adjacent Kiliuda Sections.

The Inner and Outer Ugak Bay Sections also continued to be strong herring producers in 2001. Fishery performance has been excellent in both sections in recent years. Hydroacoustic and aerial surveys of prespawning herring concentrations in Outer Ugak Bay indicated that between 1,500 and 2,000 tons were present, which represents the largest biomass observations for these sections. Primary age compositions for the Outer Ugak Bay seine area included age-4 (14%), and age-8 (77%) herring, and from the Inner Ugak Bay gillnet area also included age-4 (9%), and age-8 (82%) herring. No new information is available for the Pasagshak Bay Section, a gillnet section adjacent to the Outer Ugak Bay Section, with no harvest in the last two years.

During the 2000 and 2001 sac roe fishing seasons district-wide closures were issued for the Eastside District for seine gear because section harvests exceeded the district GHL.

Alitak District

The Alitak District comprises 10 sections and all but the Outer Alitak Section are known to have a stock of herring. Large stocks of herring were once found in Olga, Deadman, and Sulua Bays and commercial harvests ranged from 500 to 900 tons annually for the years 1991 through 1994. The Upper Olga Bay stock was the first large stock of the district that experienced declines in abundance, based on fishery performance from 1991 through 1993. The department reacted to this decline by reducing the GHLs but by 1995 the catch had dropped to zero. By 1995 the two sections in Deadman Bay were also experiencing declines in fishery performance and similarly the GHLs were reduced in 1996 and 1997. In 1997 the last of the large herring stocks of the district, Sulua

Bay, also appeared to be declining, based on fishery performance, aerial surveys, and department hydroacoustic surveys. In 1998 the department closed seven sections of the Alitak District to fishing and has relied on industry and department aerial surveys to assess changes in stock status. The department has kept the three outer sections of the Alitak District open (two are seine areas) to act as test fishery areas. This has kept industry spotters looking for herring in this district, not only in the open sections but also in closed sections (since they're in the vicinity). Industry spotter information has been shared with the department. During the last four years there has been no change in the stock status for any of the seven closed sections, and only small harvests have come from the open sections.

Mainland Districts

There are three Mainland Districts, comprising 12 sections. These Mainland districts experience more extreme weather conditions than other districts around Kodiak and Afognak Islands. Weather conditions frequently consist of high winds, low ceilings, and limited visibility, greatly reducing the effectiveness of spotters. The severity of the weather conditions in the spring likely reduces the productivity of these herring stocks, compared to more the protective waters of Kodiak and Afognak Islands. Five sections in the southern portion of the Mainland District have been designated as exploratory and are open to both gear types. Fishing effort in these three districts generally involves only one or two seine combines and a few gillnet vessels annually; fishery performance is not a good indicator of stock status. No vessels fished the Mainland Districts in 2001 and only two harvests have occurred in the last four years. In 2001 the department conducted a limited hydroacoustic survey of Kukak Bay, in the North Mainland District, and approximately 2,000 to 3,000 tons of herring were observed. Samples were collected with trawl gear and the age composition was primarily age-2 herring (99%).

Sturgeon/Halibut District

The Sturgeon/Halibut District is located on the southwest side of Kodiak Island, and has no management sections. This district consists mostly of offshore areas that are not known to have, or are not likely to have, a spawning stock of herring; no GHL has been established. Herring are found in this district during the summer months.

Year 2002 Harvest Expectations, Management Concerns, and New Research

The apportionment of 2002 GHLs for the KMA sac roe herring fishery will be completed in February 2002. The 2002 GHL will slightly increase, to approximately 1,750 tons, up 15% from the 2001 GHL. GHLs will likely be increased in the Village Islands and Ugak Bay Sections. The Raspberry Strait Section will likely be closed to fishing again in 2002. It is not anticipated that any new areas will open to fishing in 2002.

The department expects to more actively manage certain sections of the seine fishery in 2002 to slow harvest rates. This would likely occur at the start of the season, when effort levels are the highest, in areas that are known to have early spawning stocks, such as the Paramanof Bay and Village Islands Sections. Additional funds have become available to allow the department, hopefully with industry support, to evaluate the available biomass and roe maturity prior to opening the fishery (based on aerial and hydroacoustic surveys and sample seine sets). The department will

as necessary, use its emergency order authority as an additional harvest control, by limiting the duration of fishing periods and/or the specific portion of a section that may open, if overharvest concerns exist. Initial fishing periods in these sections may be short (i.e., 10 minutes) followed by a closed period, to allow the department to assess the harvest before allowing additional fishing time. The department will continue to rely on the industry to establish roe recovery standards. This change in management style will create an additional burden on the department management staff and the FWP (enforcement) staff. Support and help from the industry is necessary for this to be successful, but it should result in a more manageable fishery and be more beneficial to the long-term health of the herring stocks.

The department will likely conduct a test fishery harvest in 2002 to generate funds for herring research and management. The department is particularly interested in conducting a hydroacoustic survey of the Alitak Bay District and collecting samples from herring concentrations for age composition data. Additionally, several research projects have begun concerning interactions between Stellar sea lions and herring in the KMA. Quantitative analysis of herring biomass within select KMA bays will be estimated by these studies, which may in turn be used for fisheries management. The department is working with the Cooperative Institute for Arctic Research and the Prince William Sound Science Center on one such project, scheduled to begin in 2002. These projects will employ improved methods of herring biomass assessment that may result in better documentation and estimates of herring biomass.

HERRING FOOD/BAIT FISHERY

Historical Perspective

The earliest recorded commercial food and bait herring harvest in the KMA occurred in 1912 (Table 8). In the early 1920s the fishery expanded and large herring were sought for food products, such as salted and pickled herring, which were in high demand after World War I. By the late 1920s the demand for herring food products had declined and the fishery switched to reduction products, such as fishmeal and oil. During the peak years of the reduction fishery (1934-1950) the average harvest was 31,600 tons, which vastly surpasses recent food/bait herring harvests (Figure 11). During the reduction fishery the major harvest areas were located in eastern Shelikof Strait and adjacent bays and straits along the west side of Kodiak and Afognak Islands. Quotas and harvest weights were measured by barrels (250 lbs. of herring equaled one barrel) until 1956 when the unit of measure was changed to short tons. Historically, large (approximately 70 foot) "sardine seiner" type vessels were used in conjunction with holding pounds to supply herring to five major reduction plants. In addition, small seine and gillnet vessels participated in a portion of the food fishery and delivered to floating and shorebased salting and pickling operations.

From the early 1960s to 1973 there were no harvest quotas or closed seasons. From 1974 through 1980 an open fishing season was established between July 1 and February 28. In 1979 and 1980, GHLs for the food and bait season were established at 12,600 tons. The season opening date for the fishery changed from July 1 to August 15 for the years 1981 through 1984. As a result of the rapidly developing sac roe fishery, the GHL for the food/bait season was reduced to 1,000 tons in 1981 and remained at that level through 1987. In 1985 the season opening date was moved to August 1.

Regulatory GHLs for the food/bait herring fishery were replaced with a regulatory harvest strategy in 1988 that established variable GHLs based on herring stock status. The season opening date was moved to October 1 in 1999.

Gear used in this fishery includes trawl, gillnet, and seine. Gear was first restricted for the 1986/87 season when seine gear was limited to 100 fathoms in length and 1,025 meshes in depth and gillnet gear was limited to 150 fathoms in length with no depth restrictions. For the 1993/94 season purse seine specifications were increased to 150 fathoms in length and 1,625 meshes in depth. These changes made seine gear more competitive with trawlers; seiners harvested an average of only 2% of the food/bait harvest from 1987 through 1992 compared to 54% of the total harvest from 1993 to 1998. There are no restrictions on trawl gear, which is fished mid-water with no bottom contact. All three gear types fished the same areas and were subject to the same fishing periods. In 2001 this was designated as a limited entry fishery and, once fully implemented, will consist of four to five each of purse seine and trawl permits.

Fishery Characteristics

The current food/bait herring fishery can be best characterized as a secondary commercial fishery on herring concentrations located in KMA waters. It is primarily a bait fishery providing a frozen product for longline and pot fishers. Effort and harvest levels are at historical lows for the food/bait fishery, while the sac roe fishery supports relatively high levels of effort and harvest. Existing regulations designate priority status to the sac roe fishery.

Management Plan History

During the fall and winter months of the early 1980s major concentrations of herring were observed in eastern Shelikof Strait and adjacent bays along the west side of Kodiak and Afognak Islands. The biomass exceeded that of known KMA spawning stocks. Food/bait herring fishers targeted these herring and questions arose concerning the stock of origin of these fish. In 1986 a stock identification study, based on scale pattern analysis, was performed on herring harvested from a large biomass located in the east part of the Shelikof Strait (Johnson et. al. 1988). The study concluded that at least 80% of the East Shelikof herring sampled were Kamishak Bay stocks, which spawn within the Lower Cook Inlet (LCI) Management Area.

In 1988 the BOF allocated not more than two percent of the previous season's total available spawning biomass from Kamishak Bay for harvest during the Kodiak food/bait herring fishery. For local Kodiak spawning stocks, which were exploited during the sac roe fishery, the food/bait GHL was based on 10% of the harvest that occurred in the previous KMA sac roe herring season.

Problems subsequently arose from this management plan because it was difficult to assign harvest from the intermixed stocks to Kodiak or Kamishak when both areas had similar age compositions. This plan was in effect through the 1992/93 season.

In the fall of 1992 the BOF approved the Kamishak Bay District Herring Management Plan (5 AAC 27.465), which outlines criteria for the management of the Kamishak Bay sac roe herring and the

Shelikof Strait food/bait fishery (ADF&G 2000-2001). This plan defines allocations to each fishery based on biomass estimates.

In 1993 the BOF placed into regulation a harvest strategy defining the criteria for managing the Kodiak food/bait herring fishery (5 AAC 27.535). This strategy combines the Kamishak stock GHL with the Kodiak stock GHL for food/bait management districts FB 1 (West Afognak District), FB 4 (Uganik District), and FB 5 (Uyak District) (Figure 4). This portion of the KMA bait fishery is referred to as the Shelikof Strait Food and Bait Herring Fishery. The Kamishak allocation generally ranges from 1% to 2% of the Kamishak spawning biomass. When the combined Kodiak-Kamishak GHL is achieved the Shelikof Strait food and bait management districts (West Afognak, Uganik, and Uyak) are closed collectively. This plan alleviated the problem of identifying the spawning stock of a harvest in areas where intermixing may occur. The plan also closed the Kamishak Bay sac roe fishery and the Shelikof Strait Food/Bait Fishery north of the latitude of Miners Point (Uganik Bay) when the Kamishak spawning biomass fell below 8,000 tons (the minimum Kamishak spawning biomass threshold).

In 1999 the BOF made additional changes to the KMA food/bait fishery. The season opening date was changed to October 1 so department staff in the LCI would have additional time to complete the Kamishak herring forecast and resulting allocation for the Shelikof fishery. Prior years' fisheries generally occurred based on preliminary Kamishak forecasts. Actual harvests were often either lower or higher than the final Kamishak allocation, which was sometimes completed weeks after the fishery occurred. This later season opening date also reduced the burden on department staff in both regions that are involved with managing salmon fisheries in August and September. The harvest strategy was also changed so that GHLs for KMA stocks were based upon 10% of the GHLs established for the preceding KMA sac roe fishery by section. The previous regulation based the food/bait GHL upon 10% of the actual KMA sac roe harvest by section. In cases where an excessive harvest occurred during the sac roe fishery the related food and bait GHL would also be high. Lastly, changes to the plan clarified and put into regulation the previous practice of limiting a district harvest to no more than the sum of the individual section GHLs it contains. These changes promoted a more conservative approach to managing this fishery.

In November of 2001 the BOF adopted changes to the Kamishak Bay District Herring Management Plan based on the results of a threshold analysis preformed by LCI department staff. The analysis concluded that the minimum spawning biomass threshold should be 6,000 tons, below the previous minimum spawning biomass threshold (8,000 tons). Other changes to the plan included a reduction in the maximum exploitation rate for the Shelikof Strait fishery from 2% to 1.5% of the Kamishak spawning biomass. Lastly, a portion of the plan relating to the Shelikof Strait fishery was eliminated, which required adjustment of Shelikof Strait young age class harvest amounts to reflect the estimated weight of an equal amount of older age class herring.

Fishing Periods and Registration Permit

Fishing periods are established by emergency order. Prior to 1997 fishing periods were unrestricted, 24 hours per day, seven days per week. Fishing periods were restricted to 12 hours in duration (8:00 AM to 8:00 PM), seven days per week, partially through the 1997 season. The reduction in fishing period length was intended to slow harvest rates in order to ensure that GHLs were not greatly

exceeded. All permit holders, tenders, and buyers are required to register at the Kodiak ADF&G office prior to fishing or purchasing herring. For the 1998/99 season conditions of the registration permit were changed to make catch reporting procedures more efficient. During the registration process department staff issued the fishery harvest strategy, discussed current regulations and open areas, and reviewed catch reporting requirements. Fisher cooperation with catch reporting greatly improved as a result of the stricter requirements imposed by the department. Each landing made during this fishery was sampled for AWL information and skipper interviews were conducted to evaluate which spawning stocks were being impacted.

Kamishak Fishery Closure

The estimated biomass of Kamishak Bay herring (9,000 tons) was above threshold in 2001, however a significant segment of the population (40%) consisted of younger age class fish. The Kamishak Bay District Herring Management Plan states that commercial harvests must target older, repeat spawners in order to protect recruit-class herring that represent the future of the population. Even though the spawning biomass was greater than 8,000 tons, due to age class concerns, the Kamishak Bay sac roe fishery was closed for the 2002 season and the Shelikof Strait food and bait fishery north of the latitude of Miner's Point was closed for the 2001 season.

2001/2002 Food/Bait Fishery

The KMA food/bait fishery was closed for the 1999/2000 and 2000/2001 seasons, because of low potential GHLs and the department's concern for manageability of the fishery. On July 20, 2001, the Commercial Fisheries Entry Commission (CFEC) designated the KMA food/bait herring fishery a limited entry fishery. The CFEC issued 13 interim use permits to those fishers who made a landing in the KMA food/bait fishery between 1994 and 1998. The CFEC is in the process of determining the eligibility for final limited entry permits. The timing of the CFEC decision allowed for a 2001/2002 food/bait fishery (participation in the 2001/2002 fishery will not impact an individual's ranking for a limited entry permit). However, because of the relatively small GHLs available (60 tons in the Uganik District and 47 tons in the Eastside District) the department once again would not allow an open commercial fishery to occur, due to manageability concerns. Those individuals that were issued interim use permits formed a cooperative (co-op) arrangement. The department and CFEC agreed to allow a co-op fishery to occur under certain guidelines.

All 13 interim use permit holders had to agree to the proposed co-op fishery before the department would open the food/bait fishery. The department also stipulated that only one fishing vessel would be allowed on the grounds to conduct the co-op harvest, and a department observer must be onboard the chosen fishing vessel to monitor fishery activity and collect catch samples. The 13 interim permit holders were fully responsible for determining which vessel would conduct the co-op harvests, all marketing aspects, and all costs associated with harvesting or tendering the herring.

The KMA food/bait co-op fishery opened at 12:01 AM Monday, October 1, 2001. The fishery was limited to that portion of the Uganik District south of the latitude of Miner's Point (60 ton

GHL), and the Eastside Kodiak District (47 ton GHL). The first harvest occurred in the Uganik District with 63 tons taken and a district closure at 6:30 AM October 1, 2001. The Eastside District closed at 9:40 AM on November 15, 2001, after a harvest of 52 tons.

2002 Management Plans and New Research

It is anticipated that the new Kamishak spawning biomass minimum threshold of 6,000 tons will be met or exceeded, so the Shelikof Strait food and bait fishery and Kamishak sac roe fishery should reopen in 2002 and 2003 respectively. This would allow the department to open the entire Uganik District and the West Afognak District, which have been closed to food/bait herring fishing for the last four years. The Eastside District is also anticipated to open in 2002/2003.

The CFEC will have established limited entry by the spring of 2002. The department and permit holders will again need to work closely in order to conduct a fishery in 2002/2003 that has controlled harvest rates. The department may be able to achieve this through on the grounds monitoring of the fishery or other fishery management options, such another co-op fishery.

LCI staff has initiated the feasibility of using two new genetic stock identification techniques (fatty acid composition of heart tissue and elemental compositions of otoliths), to distinguish between Kodiak and Kamishak herring stocks. Kodiak and Kamishak herring samples collected in 2001 are currently being analyzed and results should be available in 2002.

HERRING SUBSISTENCE FISHERY

Fishery Characteristics

Prior to 1999 this fishery was referred to as a Personal Use/Subsistence Fishery and has occurred for at least twenty years. The majority of the harvest in the fishery occurred near the port of Kodiak in Womens Bay and was caught by gillnets. The herring were used primarily for bait in commercial fishery longline (halibut) and pot fisheries. Also, prior to 1999 this fishery was only regulated during the sac roe herring season, from April 15 to June 30, through the conditions of the subsistence permit issued in Kodiak. Gear was limited to a 25 fathom gillnet but there was no harvest limit. The remainder of the year there were no permit requirements, gear restrictions, or harvest limits.

In 1999 more restrictive regulations were approved by the BOF concerning the KMA subsistence herring fishery. These new regulations allow for a harvest of up to 500 pounds of herring with no permit requirements, except during the April 15 to June 30 sac roe fishing season. A subsistence permit is only required for those individuals that wish to fish during the sac roe season or intend to harvest more than 500 pounds of herring annually. The maximum annual harvest is limited to 2,000 pounds per permit. Further restrictions, concerning gear and areas open, are regulated as conditions of the permit. Seine and gillnet are legal gear, with a prohibition on the use of seines from April 15 to June 30. Commercial sac roe herring fishermen may retain herring from their lawfully taken

commercial catch to fulfill their subsistence or personal use needs. In recent years most of the herring caught for subsistence were used for sport or commercial fisheries bait, food, or fertilizer.

For the years 1991 through 1999 the number of permits issued ranged from 16 to 50, but only 18% to 60% of the permits were returned annually with harvest data (Table 9). Annual reported harvests have ranged from 975 pounds to 7,600 pounds from 1991 to 1999.

2000 and 2001 Season Summary and Issues

The subsistence harvest in 2000 was the highest experienced in the last 10 years. A total of 39 permits were issued and 21 were returned with harvest data. A total of 24,250 pounds (12.2 tons) were harvested, with the majority of the harvest, 21,150 pounds (87%) coming from the Inshore Chiniak Section of the Northeast District (this District has been closed to commercial herring fishing since 1998). This harvest occurred near the Port of Kodiak in late November and early December, taken by 11 permit holders. The increase in harvest in the Northeast District was due to increased bait needs with the reopening of the Tanner crab season in Kodiak (that began January 15, 2001). A portion of this bait was also used in longline fisheries. The majority of these herring were taken by seiners that had multiple permit holders onboard. Current regulations allow up to 2,000 pounds per permit issued; there is no limit on the number of permit holders per vessel.

Based on the harvest information from the returned permits, the department closed the Inshore Chiniak Section (NE40) to subsistence herring fishing on January 5, 2001. No GHLs had been established for the subsistence fishery. Interviews of fishery participants indicated that the herring biomass observed in the area fished was approximately 100 tons. This section closure protected the herring stock that was already exploited, yet allowed the inner bay areas (Womens, Middle, and Kalsin Bays) to remain open as several individuals had expressed interest in taking small amounts of herring for food from these areas.

The department issued an emergency order on October 9, 2001, that reduced the harvest limit to a maximum of 1,000 pounds per permit in the Northeast, North Afognak, South Afognak, Inner Marmot, and Uyak Districts. The intent was to reduce the take of herring in areas where herring stocks are rebuilding. Through December 18, 2001, a total of 47 permits have been issued. Nine permits have been returned, for a reported catch of 14,015 pounds. There has been no harvest from the Northeast District. The Kodiak tanner crab fishery is scheduled to open January 15, 2002; additional effort is anticipated.

The department is concerned that the current fishery regulations are too liberal if herring bait needs remain strong and the effort levels increase. The department is also concerned about the inappropriateness of the taking of subsistence herring for use as bait in a commercial fishery. The department has submitted a proposal to reduce harvests through a harvest limit of 500 pounds and permit requirement for all individuals that wish to participate in the subsistence taking of herring, to better track harvests and participation.

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Table 1. Historical harvest data for the commercial sac roe and food/bait herring fisheries and percent of the total annual herring harvest that occurs by fishery, Kodiak Management Area, 1964-2001.

Year	Sac Roe Fishery Harvest (Tons)	Food and Bait Fishery Harvest (Tons)	Total Herring Harvest (Tons)	Sac Roe Fishery Percent of Total Harvest (%)	Food Bait Fishery Percent of Total Harvest (%)
1964	568	310	878	65%	35%
1965	657	35	692	95%	5%
1966	2,769	198	2,967	93%	7%
1967	1,662	300	1,962	85%	15%
1968	2,001	15	2,016	99%	1%
1969	1,130	11	1,141	99%	1%
1970	342	8	350	98%	2%
1971	284	44	328	87%	13%
1972	215	50	265	81%	19%
1973	831	178	1,009	82%	18%
1974	868	40	908	96%	4%
1975	8	5	13	62%	38%
1976	5	0	5	100%	0%
1977	338	0	338	100%	0%
1978	904	399	1,303	69%	31%
1979	1,735	125	1,860	93%	7%
1980	2,383	381	2,764	86%	14%
1981	2,065	18	2,083	99%	1%
1982	1,771	326	2,097	84%	16%
1983	2,318	33	2,351	99%	1%
1984	2,163	123	2,286	95%	5%
1985	1,968	102	2,070	95%	5%
1986	1,558	213	1,771	88%	12%
1987	2,146	217	2,363	91%	9%
1988	2,171	340	2,511	86%	14%
1989	2,249	345	2,594	87%	13%
1990	2,347	313	2,660	88%	12%
1991	2,432	215	2,647	92%	8%
1992	4,283	312	4,595	93%	7%
1993	4,929	837	5,766	85%	15%
1994	5,893	677	6,570	90%	10%
1995	4,604	507	5,111	90%	10%
1996	3,386	651	4,037	84%	16%
1997	3,235	756	3,991	81%	19%
1998	2,057	127	2,184	94%	6%
1999	1,651	0	1,651	100%	0%
2000	1,370	0	1,370	100%	0%
2001	**1,694**	**115**	**1,809**	**94%**	**6%**
Average 1964-2001	**1,921**	**219**	**2,140**	**90%**	**10%**
5 Yr. Avg. 1996-00	**2,340**	**307**	**2,647**	**92%**	**8%**
10 Yr. Avg. 1991-00	**3,384**	**408**	**3,792**	**91%**	**9%**

Table 2. Sac roe herring fishery summary of season length, guideline harvest level (GHL), harvest data by gear type, percentage of harvest by gear type, number of landings, and estimated exvessel earnings, Kodiak Management Area, 1979-2001.

Year	Season Length (Days)	G-H-L (Tons)	Total Harvest (Tons)	Harvest by Gear Type		Percent Harvest by Gear Type		Number of Landings by Gear Type		Units of Gear Fished[a]		Average Catch by Gear		Estimated Average Earnings		Price per Ton ($)	Estimated Exvessel Total Value ($)
				Seine (Tons)	Gillnet (Tons)	Seine	Gillnet	Seine	Gillnet	Seine	Gillnet	Seine (Tons)	Gillnet (Tons)	Seine ($)	Gillnet ($)		
1979	36	2,400	1,735	1,457	278	84%	16%	-	-	57	125	26	2	$38,342	$3,336	$1,500	$2,602,500
1980	35	2,400	2,383	2,009	374	84%	16%	-	-	92	109	22	3	$15,068	$2,368	$690	$1,644,270
1981	48	2,400	2,065	1,596	469	77%	23%	207	406	79	114	20	4	$14,647	$2,983	$725	$1,497,125
1982	59	2,400	1,771	1,447	324	82%	18%	138	191	45	67	32	5	$17,686	$2,660	$550	$974,050
1983	51	2,400	2,319	1,797	522	77%	23%	164	284	41	64	44	8	$35,063	$6,525	$800	$1,855,200
1984	54	2,400	2,163	1,691	472	78%	22%	138	212	39	69	43	7	$34,687	$5,472	$800	$1,730,400
1985	59	2,000	1,968	1,244	724	63%	37%	118	348	34	81	37	9	$32,929	$8,044	$900	$1,771,200
1986	61	1,690	1,558	1,110	448	71%	29%	132	385	31	71	36	6	$34,016	$5,994	$950	$1,480,100
1987	61	1,640	2,146	1,591	554	74%	26%	122	411	29	62	55	9	$54,862	$8,935	$1,000	$2,146,000
1988	59	2,065	2,171	1,304	867	60%	40%	169	555	33	76	40	11	$51,370	$14,830	$1,300	$2,822,300
1989	76	2,415	2,249	1,513	736	67%	33%	171	627	37	83	41	9	$34,749	$7,535	$850	$1,911,149
1990	75	2,375	2,347	1,644	703	70%	30%	156	544	27	63	61	11	$51,756	$9,485	$850	$1,994,950
1991	83	2,510	2,432	1,697	735	70%	30%	169	587	32	64	53	11	$45,077	$9,762	$850	$2,067,200
1992	77	2,720	4,283	3,260	1,023	76%	24%	185	706	40	74	82	14	$40,750	$6,912	$500	$2,141,500
1993	77	3,525	4,929	4,203	726	85%	15%	237	294	41	86	103	8	$56,382	$4,643	$550	$2,710,950
1994	71	4,550	5,893	4,976	917	84%	16%	285	485	66	57	75	16	$60,315	$12,870	$800	$4,714,400
1995	73	4,480	4,604	3,837	768	83%	17%	280	642	73	71	53	11	$66,858	$13,759	$1,272	$5,856,288
1996	69	4,180	3,386	2,322	1,064	69%	31%	202	890	57	74	41	14	$81,474	$28,757	$2,000	$6,772,000
1997	49	3,435	3,235	2,629	606	81%	19%	183	418	64	59	41	10	$12,323	$3,081	$300	$970,500
1998	50	2,030	2,057	1,954	103	95%	5%	110	26	35	7	56	15	$16,749	$4,414	$300	$617,100
1999	38	1,495	1,651	1,589	62	96%	4%	94	16	31	5	51	12	$23,732	$5,741	$463	$764,413
2000 b	37	1,735	1,370	1,290	80	94%	6%	57	23	31	10	42	8	$20,806	$4,000	$500	$685,000
2001	**47**	**1,540**	**1,694**	**1,412**	**282**	**83%**	**17%**	**67**	**37**	**33**	**9**	**43**	**31**	**$21,394**	**$15,667**	**$500**	**$847,000**
Averages																	
1979-2001	**58**	**2,556**	**2,626**	**2,068**	**558**	**79%**	**21%**	**161**	**385**	**46**	**65**	**48**	**10**	**$37,436**	**$8,164**	**$824**	**$2,198,939**
Five Year																	
1996-2000	**49**	**2,575**	**2,340**	**1,957**	**383**	**87%**	**13%**	**129**	**275**	**44**	**31**	**46**	**12**	**$31,017**	**$9,199**	**$713**	**$1,961,803**
Ten Year																	
1991-2000	**62**	**3,066**	**3,384**	**2,776**	**608**	**83%**	**17%**	**180**	**409**	**47**	**51**	**60**	**12**	**$42,447**	**$9,394**	**$754**	**$2,729,935**

[a] From 1979-1998 fishery participation was based on vessels making landings, 1999-2001 data based on actual participation.

[b] An allocative harvest strategy was in effect starting in 2000.

Table 3. Sac roe herring fishery guideline harvest level (GHL) by section and gear type, harvest by section, and date sections were closed for the Kodiak Management Area 2001.

STATISTICAL AREA	MANAGEMENT SECTION	DATE CLOSED	PURSE SEINE		GILLNET	
			GHL	Harvest	GHL	Harvest
NORTH AFOGNAK DISTRICT						
NA10	Shuyak Island	CLOSED				
NA20	Delphin Bay	CLOSED				
NA30	Perenosa Bay	CLOSED				
NA40	Seal Bay	CLOSED				
NA50	Tonki Bay	**6/30/01**			10	0
DISTRICT TOTAL					**10**	0
WEST AFOGNAK DISTRICT						
WA10	Raspberry Strait	**6/30/01**			15	0.3
WA20	Malina Bay	**4/18/01**			15	14.7
WA31	Paramanof Bay	**4/15/01**	225	614.1		
WA32	Foul Bay	**4/25/01**			30	30.4
WA40	Blue Fox/Devil's Inlet	**6/30/01**			10	0
WA50	Offshore W. Afognak	CLOSED				
DISTRICT TOTAL			**225**	**614.1**	**70**	**45.4**
SOUTH AFOGNAK DISTRICT						
SA10	Izhut Bay	CLOSED				
SA20	Kitoi Bay	CLOSED				
SA30	MacDonalds Lagoon	CLOSED				
SA40	Danger Bay	**4/28/01**			15	20.4
SA50	Litnik	CLOSED				
SA60	Duck Bay	CLOSED				
DISTRICT TOTAL					**15**	**20.4**
UGANIK DISTRICT						
UG10	Kupreanof	CLOSED				
UG20	Viekoda	**4/24/01**	80	76.0		
UG21	Terror Bay	**5/18/01**	100	34.8		
UG30	Village Island	**4/15/01**	275	303.4		
UG31	West Uganik Pass	**6/30/01**			15	9.4
UG32	NE Arm Uganik	**6/30/01**			10	0
UG33	E. Arm Uganik	**6/30/01**			20	0
UG34	S. Arm Uganik	**5/8/01**			100	106.3
UG40	Offshore Uganik	CLOSED				
DISTRICT TOTAL			**455**	**414.2**	**145**	**115.7**
UYAK DISTRICT						
UY10	Offshore Uyak	CLOSED				
UY20	Harvester Island	CLOSED				
UY30	Inner Uyak	CLOSED				
UY32	Browns Lagoon	CLOSED				
UY31	Larsen Bay	CLOSED				
UY40	Zachar Bay	CLOSED				
UY50	Spiridon Bay	CLOSED				
DISTRICT TOTAL		**CLOSED**				

-Continued-

Table 3. (page2 of 3)

STATISTICAL AREA	MANAGEMENT SECTION	DATE CLOSED	PURSE SEINE		GILLNET	
			GHL	Harvest	GHL	Harvest
ALITAK DISTRICT						
AL10	Outer Alitak	CLOSED				
AL20	Inner Alitak	**6/30/01**	10	0		
AL21	Inner Deadman Bay	CLOSED				
AL22	Outer Deadman Bay	CLOSED				
AL30	Sulua Bay	CLOSED				
AL31	Portage Bay	**6/30/01**	30	11.1		
AL40	Lower Olga/Moser	CLOSED				
AL41	No. Upper Olga Bay	CLOSED				
AL50	Upper Olga Bay	CLOSED				
AL60	Geese/Twoheaded	**6/30/01**			15	0
DISTRICT TOTAL			**40**	**11.1**	**15**	**0**
STURGEON/HALIBUT DISTRICT						
SH10	**Sturgeon/Halibut**	**CLOSED**				
EASTSIDE DISTRICT						
EA10	Kaiugnak	*Note: Sections EA10 and EA20 managed as one section, 10 ton GHL.				
EA20	SW. Sitkalidak	**4/27/01**	10	0		
EA21	Three Saints Bay	**6/30/01**			15	0
EA22	Newman Bay	*Note: Sections EA22 and EA23 managed as one section, 50 ton GHL.				
EA23	W. Sitkalidak Strait	**4/27/01**	50	22.8		
EA24	Barling Bay	**4/23/01**	40	36.1		
EA30	E. Sitkalidak St.	**4/27/01**	40	51.8		
EA31	Tanginak Anchorage	CLOSED				
EA40	Outer Sitkalidak	CLOSED				
EA41	Boulder Bay	**6/30/01**			10	0
EA42	Shearwater Bay	**6/30/01**			30	22.0
EA43	Outer Kiliuda Bay	**4/19/01**	80	129.3		
EA44	Inner Kiliuda Bay	**4/23/01**	80	87.9		
EA50	Outer Ugak Bay	**4/27/01**	50	44.1		
EA51	Inner Ugak Bay	**5/16/01**			60	78.7
EA52	Pasagshak	**6/30/01**			10	0
DISTRICT TOTAL			**350**	**372.0**	**125**	**100.7**
NORTHEAST DISTRICT						
NE10	Womens Bay	CLOSED				
NE20	Kalsin Bay	CLOSED				
NE30	Middle Bay	CLOSED				
NE40	Inshore Chiniak	CLOSED				
NE50	Offshore Chiniak	CLOSED				
DISTRICT TOTAL		**CLOSED**				
INNER MARMOT DISTRICT						
IM10	Monashka Bay	CLOSED				
IM20	Anton Larsen Bay	CLOSED				
IM30	Sharatin Bay	CLOSED				

-Continued-

Table 3. (page 3 of 3)

STATISTICAL AREA	MANAGEMENT SECTION	DATE CLOSED	PURSE SEINE		GILLNET	
			GHL	Harvest	GHL	Harvest
IM40	Kizhuyak Bay	CLOSED				
IM50	Spruce Island	CLOSED				
DISTRICT TOTAL		**CLOSED**				
NORTH MAINLAND DISTRICT						
NM10	Hallo Bay	CLOSED				
NM20	Inner Kukak	**6/30/01**			25	0
NM30	Outer Kukak	CLOSED				
NM40	Missak Bay	CLOSED				
DISTRICT TOTAL					**25**	**0**
MID MAINLAND DISTRICT						
MM10	Inner Katmai	**6/30/01**	50	0		
MM20	Outer Katmai	CLOSED				
MM30	Alinchak	**6/30/01**	15	0		
MM40	Puale Bay	EXPLORATORY		0		0
MM50	Portage Bay	EXPLORATORY		0		0
MM60	Outer Portage	EXPLORATORY		0		0
DISTRICT TOTAL			**65**	**0**	**0**	**0**
SOUTH MAINLAND DISTRICT						
SM10	Wide Bay	EXPLORATORY		0		0
SM20	Lower Shelikof	EXPLORATORY		0		0
DISTRICT TOTAL			**0**	**0**	**0**	**0**
				Seine		**Gillnet**
	Total GHL All Gear	**Total Catch All Gear**	**GHL**	**Harvest**	**GHL**	**Harvest**
GRAND TOTAL	**1,540**	**1,694**	**1,135**	**1,411.4**	**405**	**282.2**
			% of GHL	**% Harvest**	**% of GHL**	**% Harvest**
			74%	**83%**	**26%**	**17%**

Table 4. Age composition, by percent, of sac roe herring samples from the commercial purse seine harvest by section, Kodiak Management Area, 2001.

District	Harvest	Percent at Age													
Section	(tons)	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14	n
West Afognak															
Paramanof Bay	614.1	0.0	3.7	28.6	1.7	2.2	11.8	16.8	3.2	6.0	8.7	12.5	3.7	0.5	398
Uganik															
Viekoda Bay	76.0	0.0	20.2	44.8	5.8	4.2	16.2	7.3	0.2	0.4	0.4	0.0	0.0	0.0	424
Terror Bay	34.8	1.0	35.0	46.5	3.6	2.6	8.9	1.5	0.0	0.0	0.5	0.0	0.0	0.0	191
Village Islands	303.4	0.0	14.6	63.3	2.9	2.5	9.9	3.1	0.3	0.7	0.5	1.5	0.2	0.0	855
Eastside															
W. Sitkalidak Straits	22.8	0.0	5.3	48.0	3.1	1.1	4.2	31.9	1.9	1.4	0.0	0.2	1.6	0.8	354
Barling Bay	36.1	0.0	11.2	55.5	1.8	0.4	4.0	22.8	1.2	0.4	0.6	0.4	0.6	0.8	490
E. Sitkalidak Straits	51.8	0.0	13.3	55.3	0.0	0.6	8.6	16.6	0.6	1.3	0.0	0.6	2.0	0.6	150
Outer Kiliuda Bay	129.3	0.0	21.9	41.6	2.5	0.1	2.6	26.0	1.5	0.5	0.5	0.5	0.5	1.1	519
Inner Kiliuda Bay	87.9	0.0	21.9	42.1	2.1	0.2	2.9	27.8	0.4	0.4	0.0	0.4	0.7	0.4	410
Outer Ugak Bay	44.1	0.0	0.4	14.0	1.3	0.4	3.0	77.1	3.5	0.0	0.0	0.0	0.0	0.0	228
All samples combined [a]	1400.3	0.0	11.0	41.0	2.3	1.9	9.4	16.8	1.8	3.0	4.0	6.0	1.9	0.4	4019

[a] All samples combined data, weights the harvest by section to the age class data to estimate the overall age composition of the purse seine catch.

Table 5. Age composition, by percent, of sac roe herring samples from the commercial gillnet harvest by section, Kodiak Management Area, 2001.

District	Harvest	Percent at Age													
Section	(tons)	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14	n
West Afognak															
Malina Bay	14.7	0.0	0.0	4.6	0.0	9.3	32.8	34.3	3.1	3.1	6.2	4.6	1.5	0.0	64
South Afognak															
Danger Bay	20.4	0.0	0.0	11.3	8.8	3.7	21.5	50.6	2.5	0.0	0.0	0.0	1.2	0.0	79
Uganik															
S. Arm Uganik	106.3	0.0	0.8	29.9	2.5	12.8	41.0	5.9	2.5	1.7	0.8	1.7	0.0	0.0	117
Eastside															
Inner Ugak Bay	78.7	0.0	0.0	8.6	0.0	0.8	2.6	81.7	6.0	0.0	0.0	0.0	0.0	0.0	115
All samples combined [a]	220.1	0.0	0.4	18.9	2.0	7.4	24.9	39.0	3.8	1.0	0.8	1.1	0.2	0.0	375

[a] All samples combined data, weights the harvest by section to the age class data to estimate overall age composition of the gillnet catch.

Table 6. Average weight in grams by age class of sac roe herring samples from the commercial purse seine harvest by section, Kodiak Management Area, 2001.

District	Average Weight in Grams at Age													
Section	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14	n
West Afognak														
Paramanof Bay	-	90	126	143	199	203	222	241	249	246	260	260	272	397
Uganik														
Viekoda Bay	-	90	121	142	172	193	197	208	263	265	-	-	-	416
Terror Bay	53	96	123	138	217	205	195	-	-	204	-	-	-	190
Village Islands	-	89	122	146	187	195	207	223	234	226	244	240	-	855
Eastside														
W. Sitkalidak Straits	-	104	166	189	215	292	297	319	343	-	353	341	342	353
Barling Bay	-	112	166	212	230	270	307	316	339	323	316	367	312	490
E. Sitkalidak Straits	-	115	159	-	181	263	290	294	355	-	298	287	375	150
Outer Kiliuda Bay	-	129	172	216	206	279	292	302	336	284	338	359	373	519
Inner Kiliuda Bay	-	125	171	200	224	260	292	306	361	-	320	353	367	410
Outer Ugak Bay	-	125	179	188	230	252	278	267	-	-	-	-	-	228

Table 7. Average weight in grams by age class of sac roe herring samples from the commercial gillnet harvest by section, Kodiak Management Area, 2001.

District	Average Weight in Grams at Age													
Section	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-10	Age-11	Age-12	Age-13	Age-14	n
West Afognak														
Malina Bay	-	-	163	-	167	199	212	200	220	213	219	229	-	64
South Afognak														
Danger Bay	-	-	170	206	234	244	268	322	-	-	-	280	-	79
Uganik														
S. Arm Uganik	-	109	143	150	183	192	237	206	217	242	242	-	-	117
Eastside														
Inner Ugak Bay	-	-	173	-	287	254	258	253	-	-	-	-	-	115

Table 8. Historical food and bait herring harvest for the Kodiak Management Area, 1912-2001.

Year	Tons	Year	Tons	Year	Tons
1912	20	1942	16,791	1972	50
1913	0	1943	35,352	1973	178
1914	0	1944	26,835	1974	40
1915	0	1945	31,114	1975	5
1916	70	1946	47,506	1976	No data
1917	138	1947	50,743	1977	No data
1918	118	1948	46,428	1978	399
1919	260	1949	0	1979	125
1920	46	1950	44,133	1980	381
1921	945	1951	4,299	1981	18
1922	1,483	1952	1,389	1982	326
1923	322	1953	725	1983	33
1924	4,823	1954	0	1984	123
1925	9,997	1955	0	1985	102
1926	2,681	1956	13,524	1986	213
1927	2,593	1957	21,219	1987	217
1928	625	1958	1,711	1988	340
1929	No data	1959	3,831	1989	345
1930	622	1960	0	1990	313
1931	1,000	1961	0	1991	215
1932	3,594	1962	0	1992	312
1933	2,313	1963	0	1993	784
1934	60,000	1964	310	1994	677
1935	No data	1965	35	1995	507
1936	24,748	1966	198	1996	651
1937	27,659	1967	300	1997	756
1938	24,522	1968	15	1998	127
1939	38,601	1969	11	1999	Fishery Closed
1940	22,677	1970	8	2000	Fishery Closed
1941	40,084	1971	44	2001	115

Table 9. Subsistence herring harvest summary for the Kodiak Management Area, 1991-2001.

Year	Number Permits Issued	Number Permits Returned	Estimated Harvest (lbs.) by District							
			Afognak	Northeast	Inner Marmot	Uganik	Uyak	Eastside	Alitak	Total
1991	50	9	2,110	1,745	1,745	1,000	0	0	0	6,600
1992	45	10	120	250	250	1,000	0	0	320	1,940
1993	50	16	90	3,000	3,910	550	50	0	0	7,600
1994	47	14	90	740	1,350	2,000	200	0	0	4,380
1995	20	6	75	0	500	0	340	0	175	1,090
1996	23	10	550	180	140	0	590	0	0	1,460
1997	16	7	0	200	350	50	1,325	0	0	1,925
1998	18	10	1,240	0	0	50	0	0	0	1,290
1999	15	9	0	200	350	0	425	0	0	975
2000	39	21	575	21,150	0	1,825	0	0	700	24,250
2001[a]	47	9	3,000	0	0	0	1,015	10,000	0	14,015

[a] Total catch reported through 12/18/01.

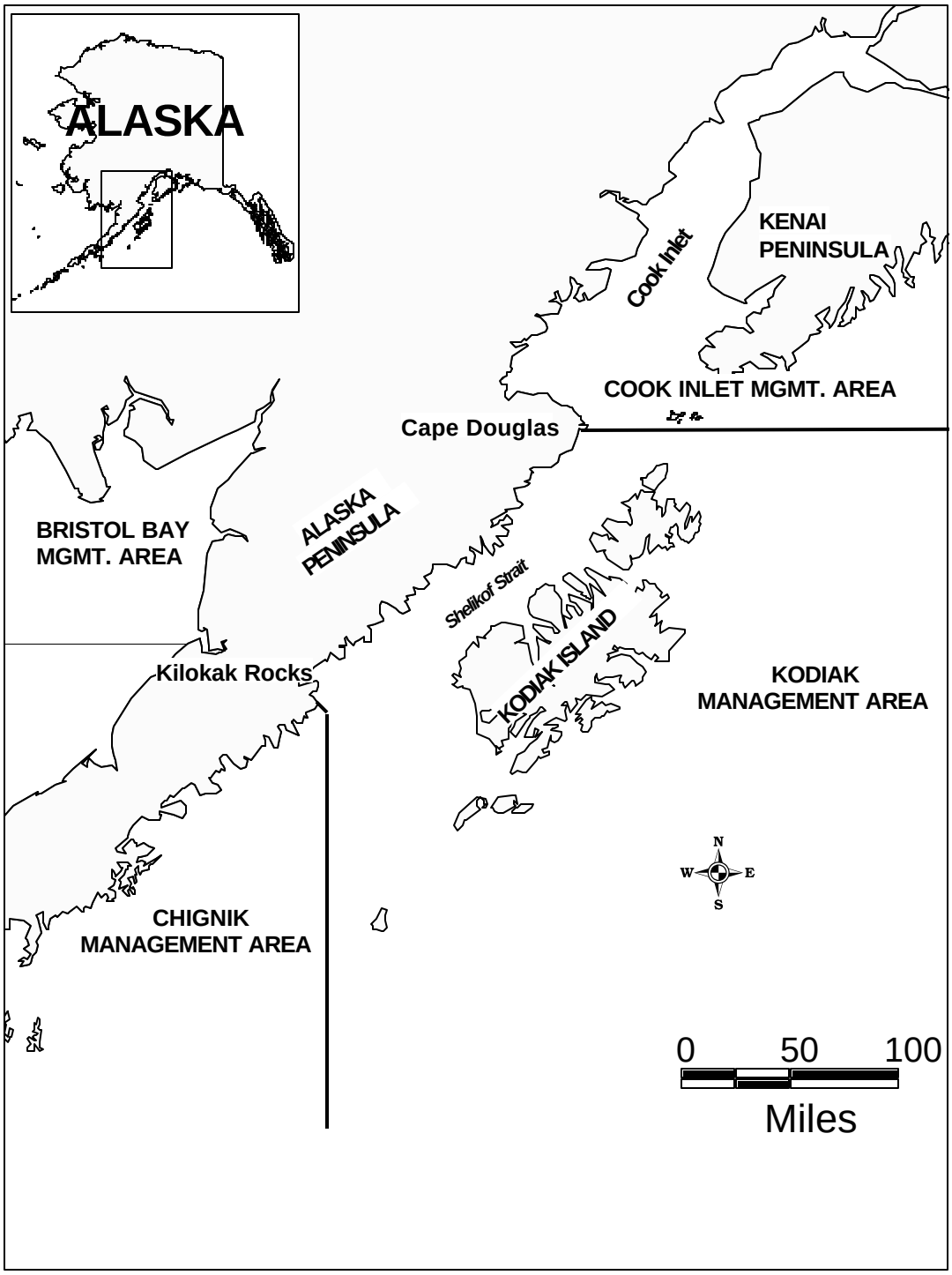


Figure 1. Map of southwestern Alaska emphasizing the Kodiak Management Area and its relationship to surrounding management areas.

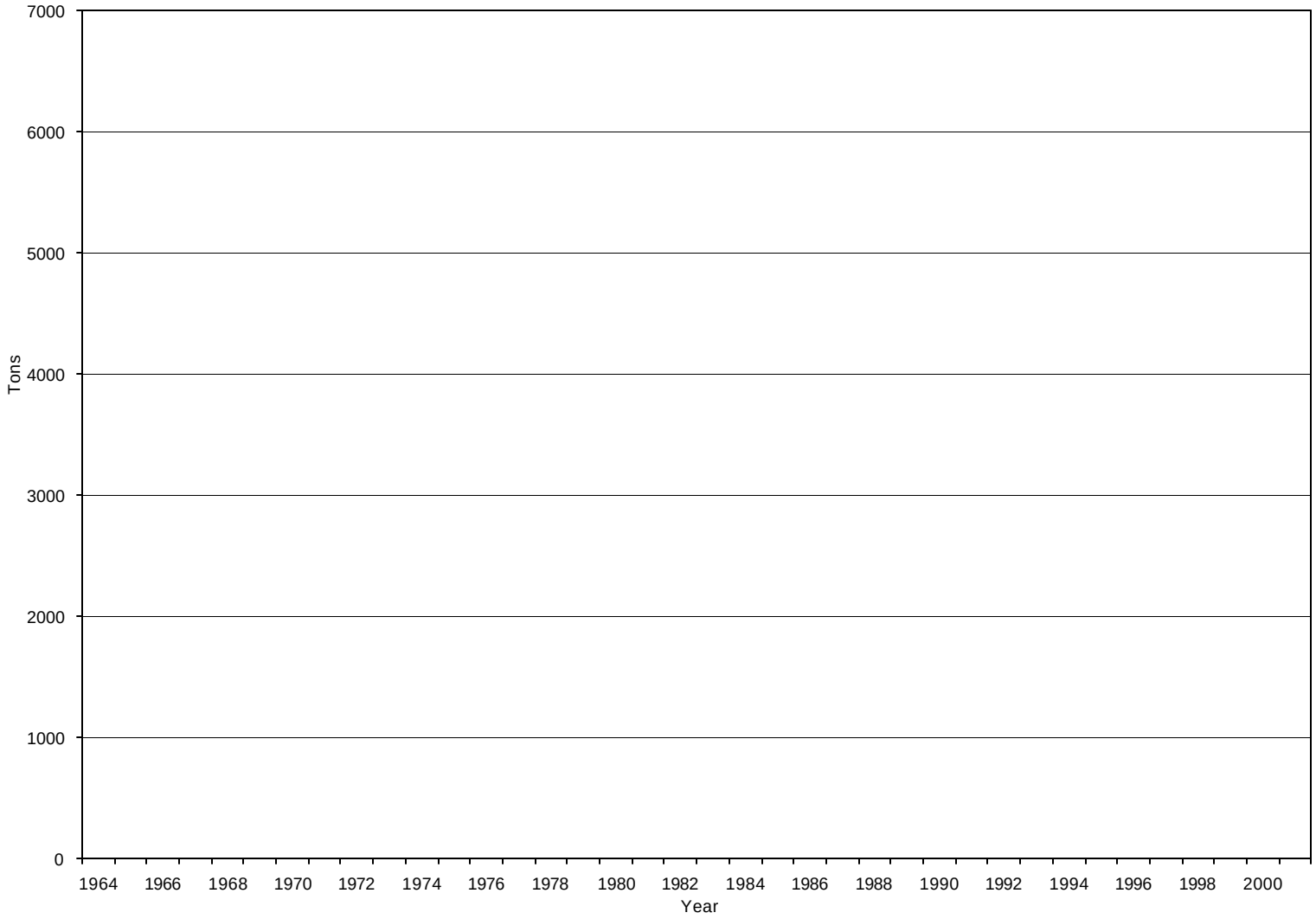


Figure 2. Historical commercial sac roe herring fishery harvest, Kodiak Management Area, 1964-2001.

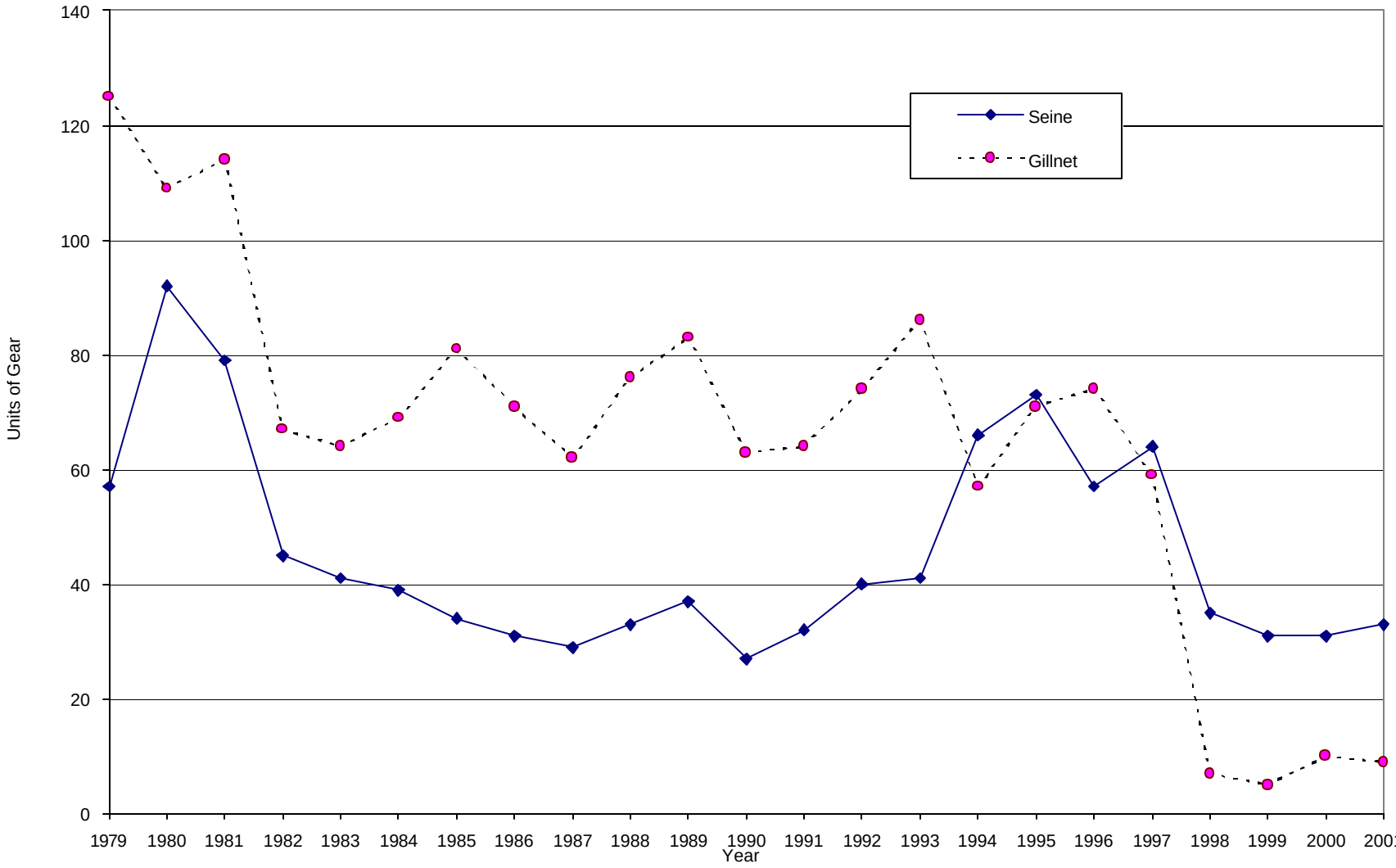


Figure 3. Number of units of gear which made a landing in 1979-1998 or participated in the 1999-2001 sac roe herring fishery in the Kodiak Management Area.

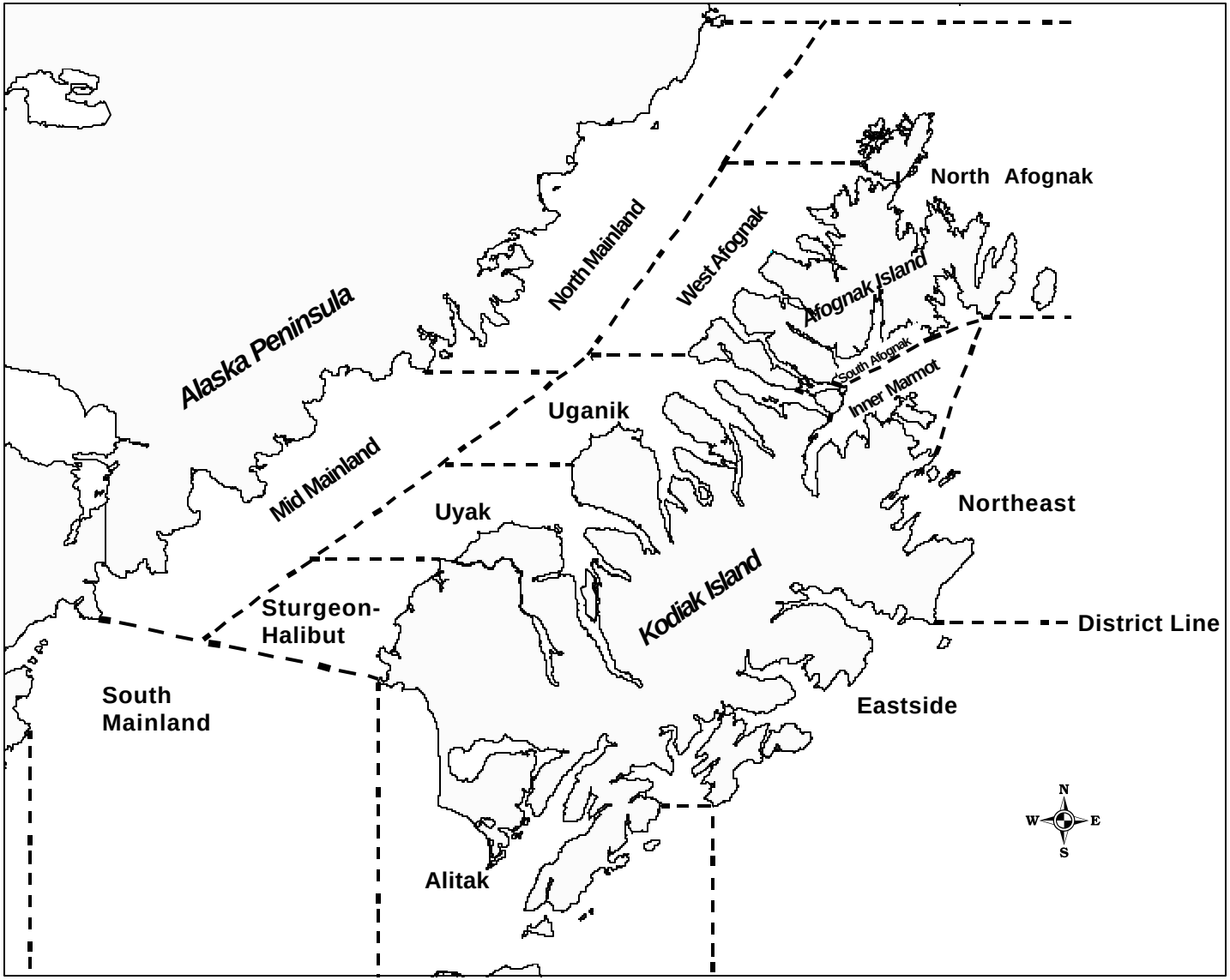


Figure 4. Map of the Kodiak Management Area illustrating the herring fishery districts.

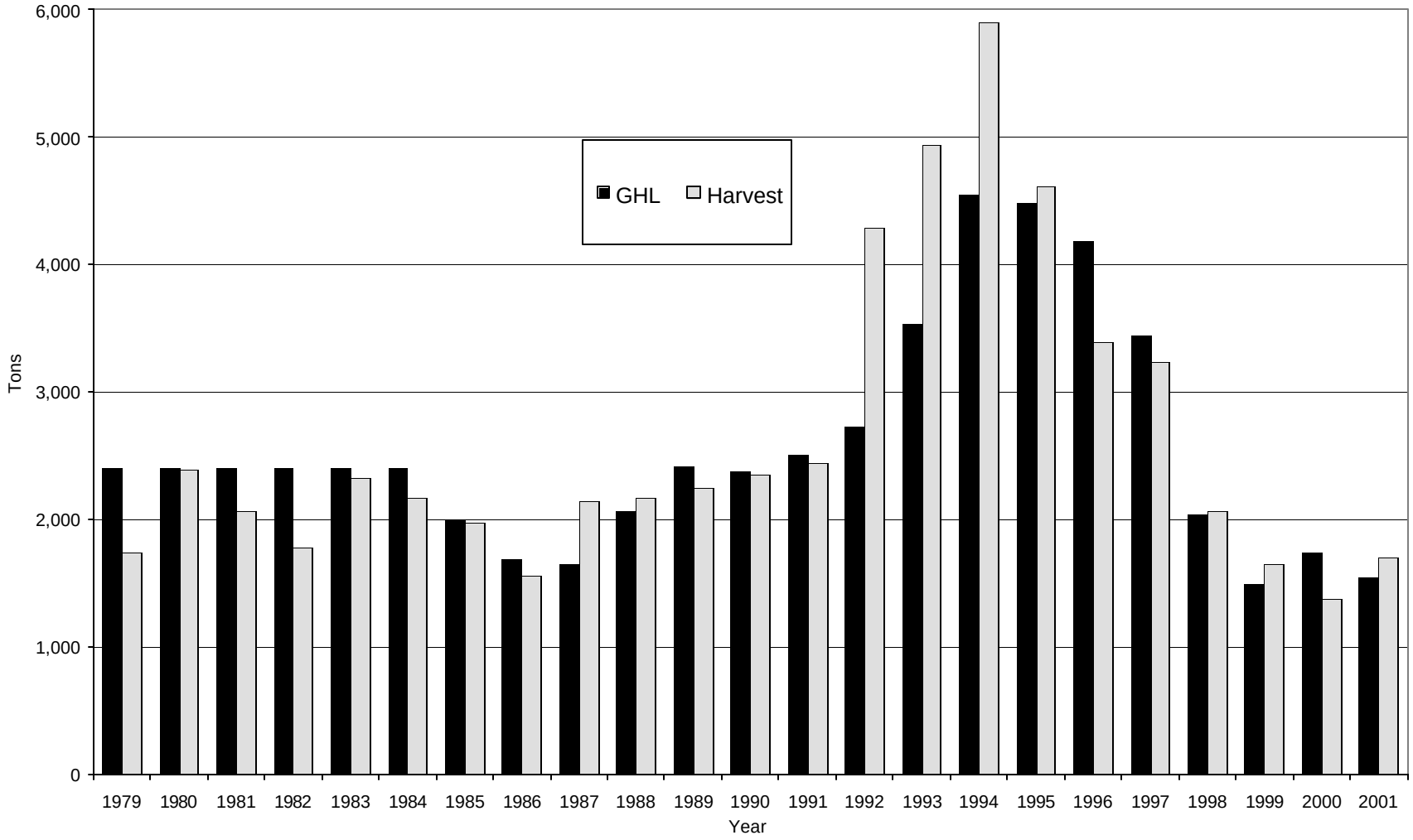


Figure 5. Comparison of the guideline harvest level (GHL) to the sac roe herring harvest in the Kodiak Management Area, 1979-2001.

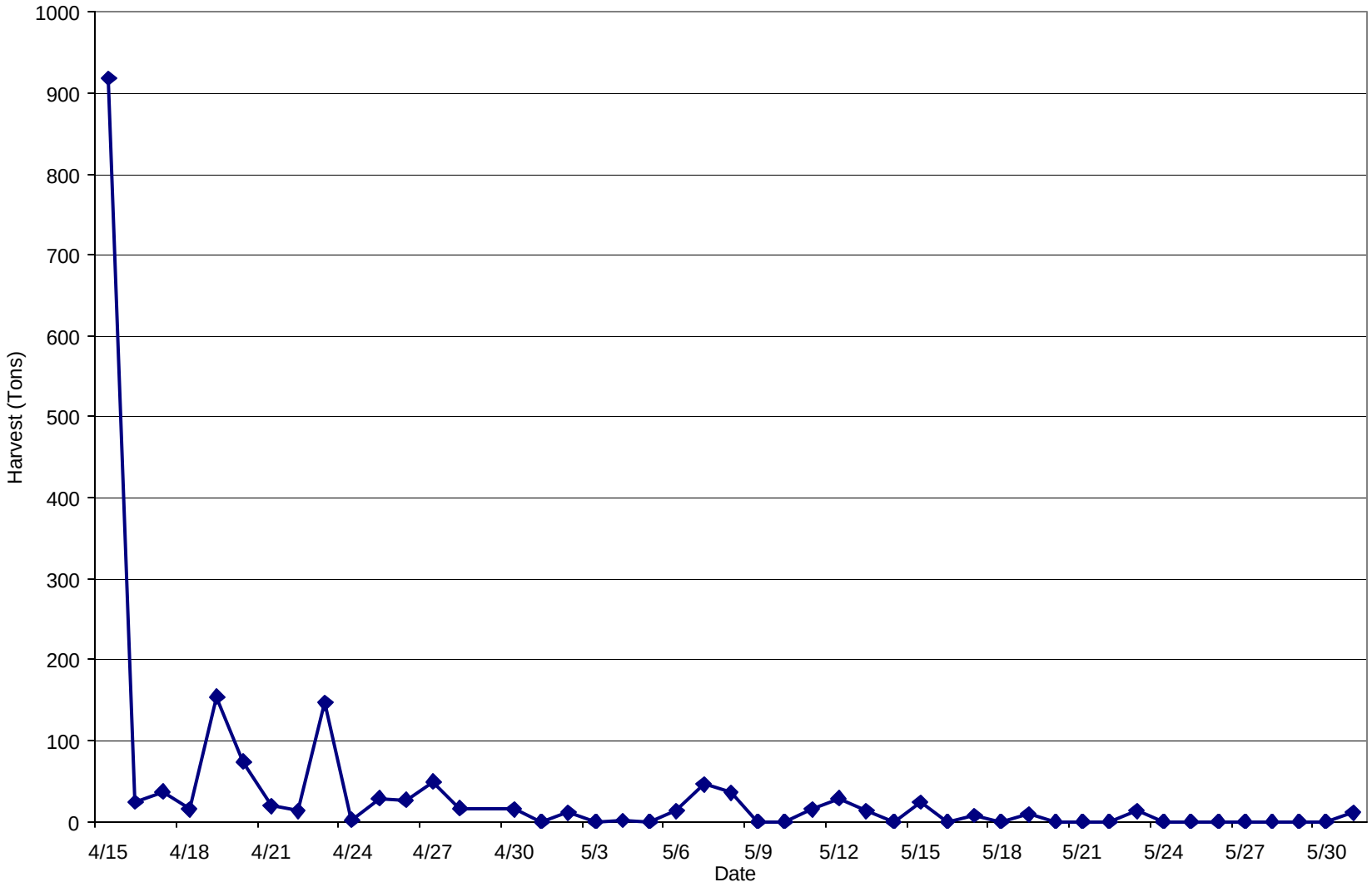


Figure 6. Commercial sac roe herring harvest by day for the Kodiak Management Area, 2001.

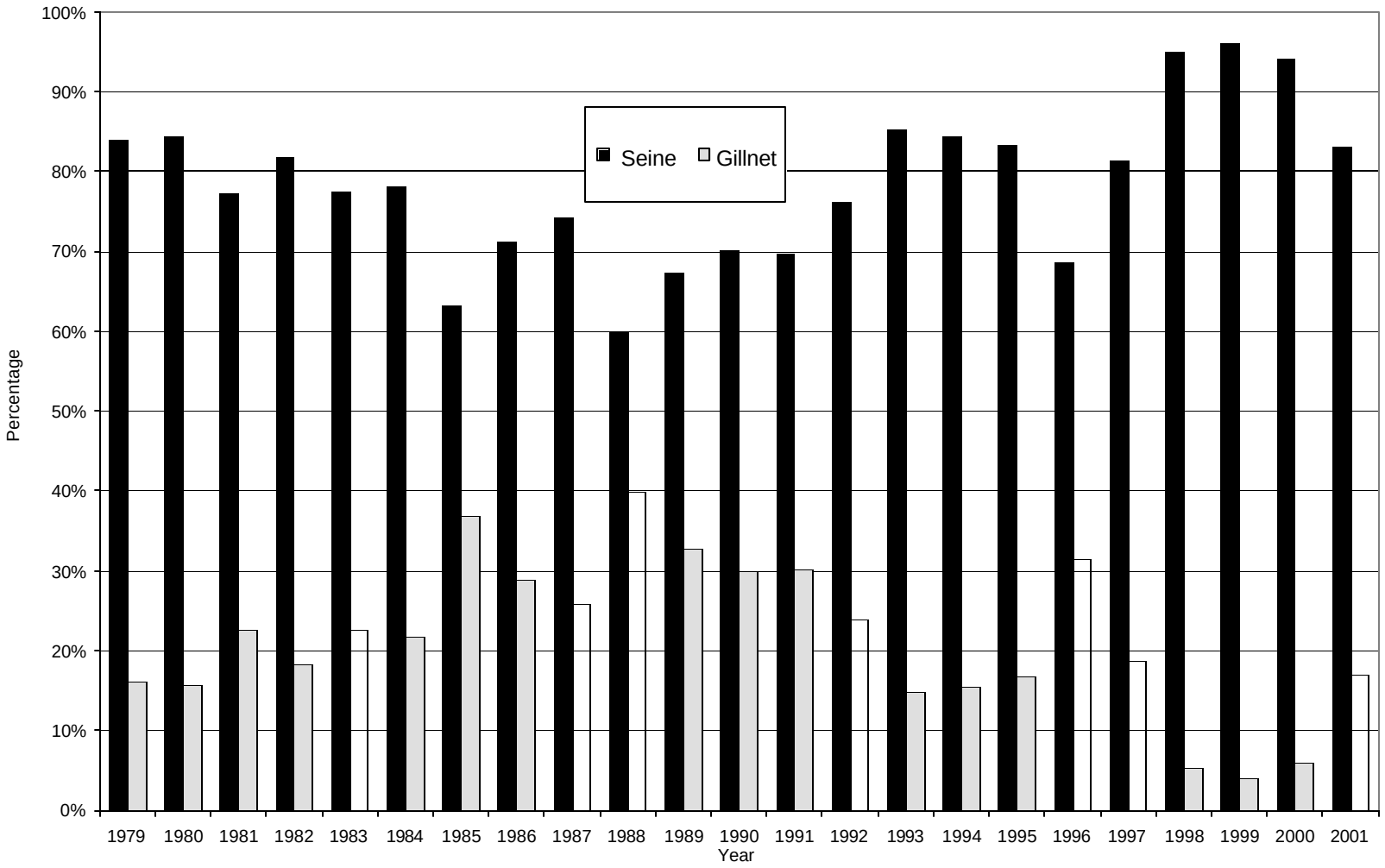


Figure 7. Percent of the total harvest taken by gear type for the sac roe herring fishery, Kodiak Management Area, 1979- 2001.

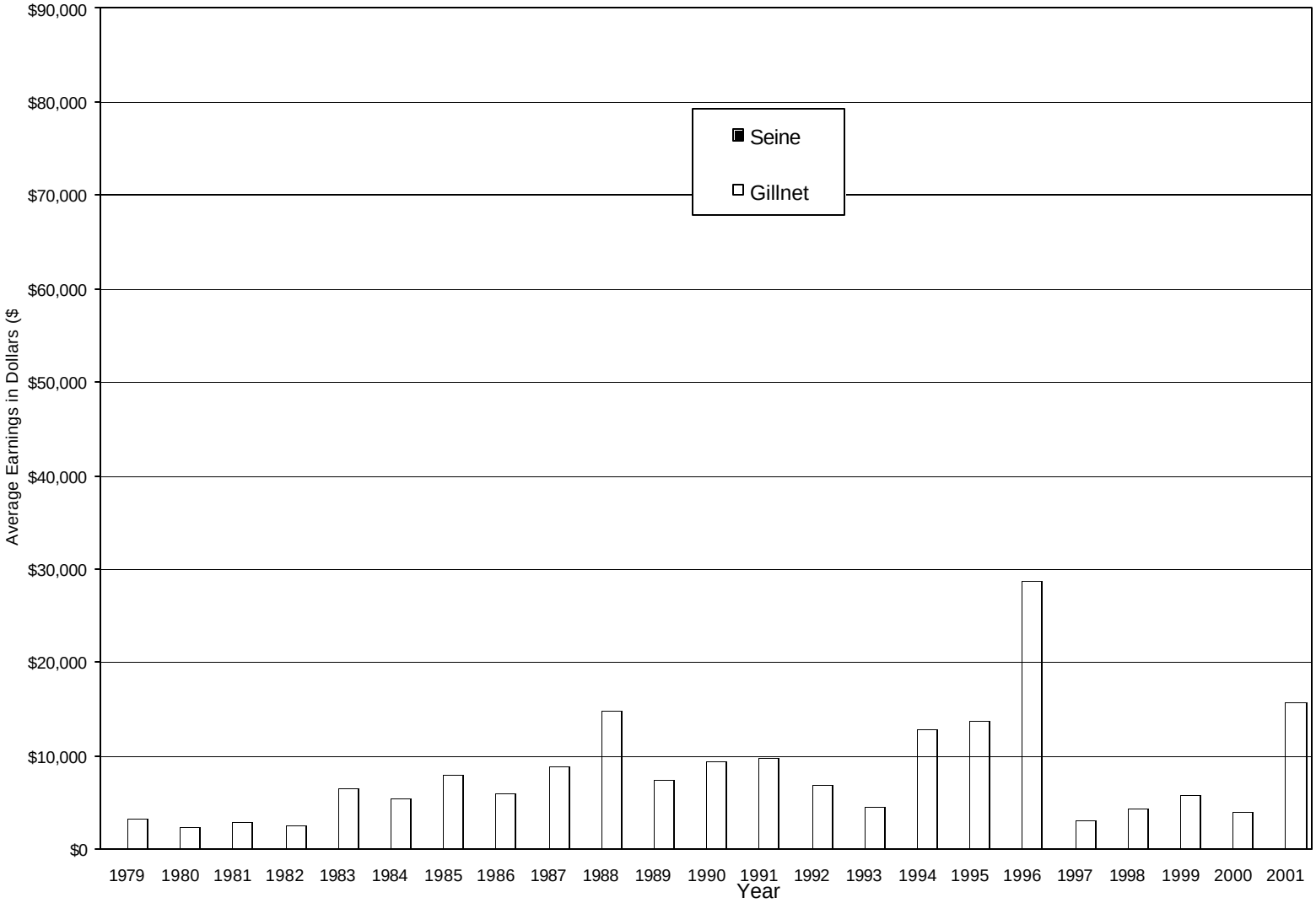


Figure 8. Average earnings (dollars) by year and gear type for the sac roe herring fishery, Kodiak Management Area, 1979-2001.

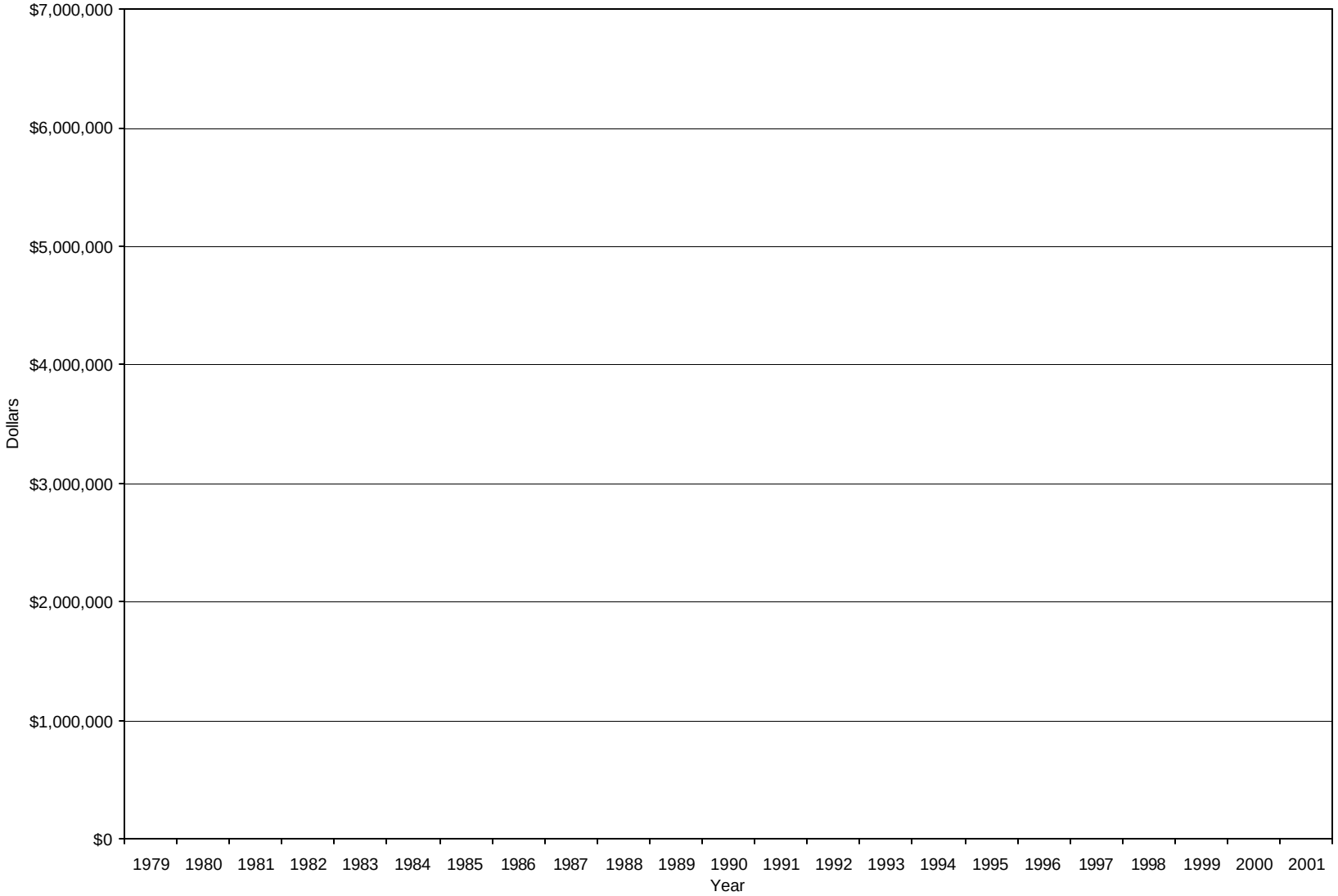
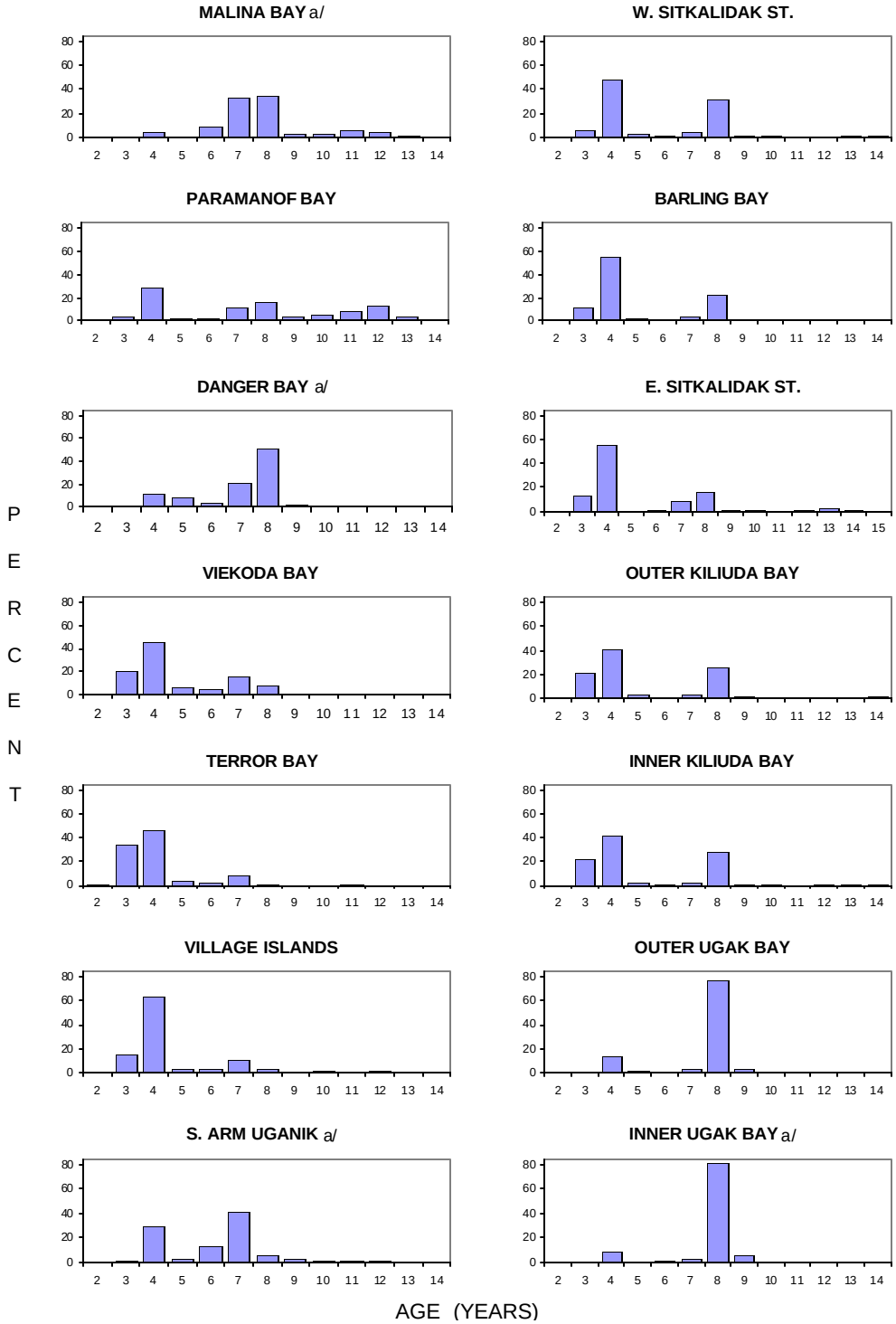


Figure 9. Total exvessel value (dollars) by year for the sac roe herring fishery in the Kodiak Management Area, 1979-2001.



[a] Indicates commercial gillnet sample.

Figure 10. Age composition by section of commercial sac roe herring harvests, Kodiak Management Area, 2001.

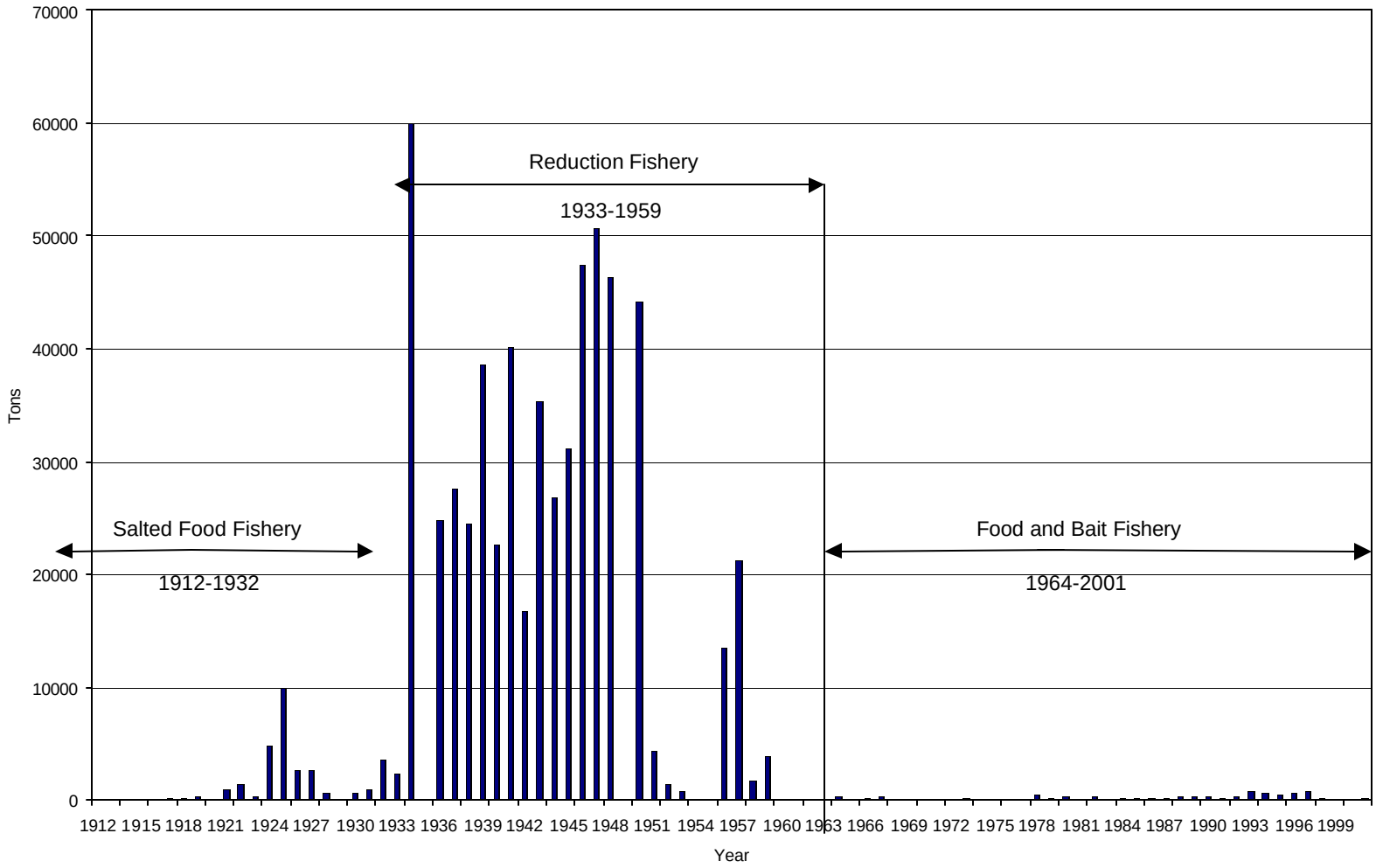


Figure 11. Historical food and bait herring fishery harvest for the Kodiak Managemnt Area, 1912-2001.